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## THE FIFTEEN-INCH GUN.

On page 202 of our current volume we gave a brief description of this enormous piece of artillery, and we now present an engraving of it, with fuller particulars, which we take from Major J. G. Barnard's "Notes on Sea-Coast Defense." The location of this gun at the mouth of the Chesapeake, the approach to Washington from the sea, gives it special interest at the present time :—

The fifteen-inch gun, at Fort Monroe, was cast at the Fort Pitt Foundry of Messrs. Knapp, Rudd & Co., Pittsburg, under the direction and after the method of Captain T. J. Rodman, of the Ordnance Corps, to whose perseverance, zeal and laborious investigations the successful result is mainly due.

Its dimensions are as follows :—

| | Inches. |
|---|---|
| Total length of gun | 190 |
| Length of caliber of bore | 156 |
| Length of ellipsoidal chamber | 9 |
| Total length of bore | 165 |
| Maximum exterior diameter | 48 |
| Distance between rimbases | 48 |
| Diameter at muzzle | 25 |
| Thickness of metal behind the chamber | 25 |
| Thickness at junction of bore with chamber | 16½ |
| Thickness at muzzle | 5 |
| Weight of gun | 49,100 lbs. |

It is mounted upon an iron center-pintle carriage, the top carriage of which recoils upon the rails of the lower one, and permits, by a ratchet cut in the breech of the gun, an elevation of about 28½°. The rails of the lower carriage being inclined, the gun runs forward, of itself, from the position of recoil into battery, on rollers attached to an eccentric axis, easily brought to bear by two men with handspikes. Notwithstanding its great weight, it was easily manipulated by a firing party consisting of a sergeant with six men.

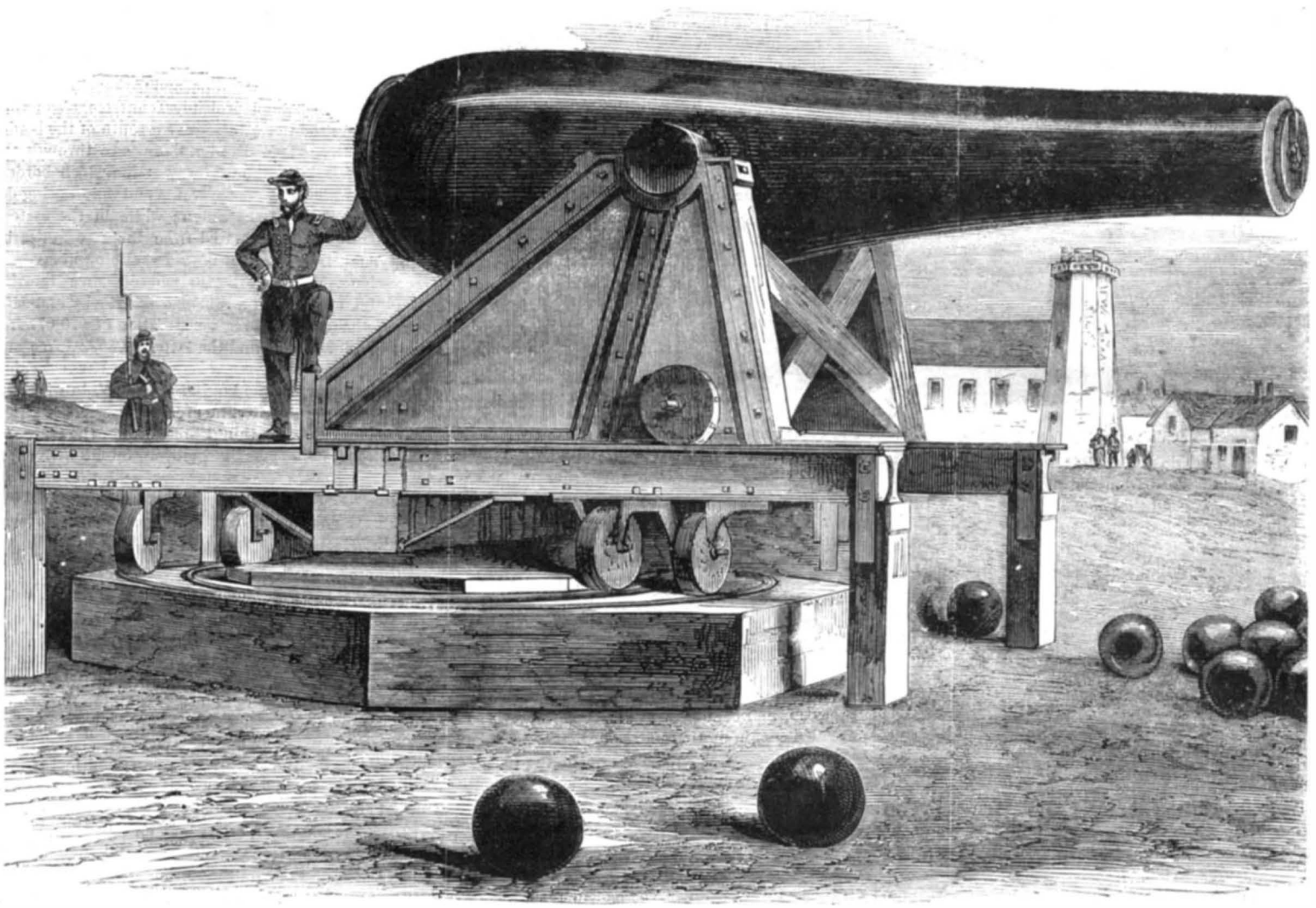
When fired horizontally, or nearly so, the time of loading and running into battery was, in one case, 1 minute and 10 seconds ; in another, 1 minute and 52 seconds.

When fired at its maximum elevation of 28° 35′, the time of loading—including depressing, sponging, loading, elevating again, and running into battery—varied from 3 minutes and 10 seconds to 4 minutes.

The shell is attached to an oaken sabot. In loading, it is seized by nippers, the points of which enter small holes in opposite extremities of a diameter of the spherical surface. Four men, with a handspike passed through a ring (of the nippers), and standing on a platform about 4 feet below the muzzle, easily raise it. When opposite the muzzle, another man turns it on the axis of suspension, so as to introduce the sabot into the bore. It is then easily rammed home.

The weight of the shells used during the firing made in presence of the board of officers varied from 305 to 337 lbs. Capt. Rodman proposes to make them of two classes. The first for use, properly speaking, as a shell, may vary in weight according to the particular purposes for which it may be required. Where the greatest possible explosive effect is wanted, the shell could be of the minimum thickness admissible (to endure the shock of the charge), which, if supposed to be 2½ inches, would make a shell of about 305 lbs. weight, containing from 16 to 18 lbs. of powder. For battering, the shell would have a wall of 5 inches thickness and weight of about 410 lbs. The windage is one-tenth inch, and a solid shot would weigh 425 lbs. It is not deemed practicable to cast a satisfactory solid shot of this diameter (for reasons already mentioned connected with solid castings of large masses), and it is believed a shell of this thickness would present the maximum resistance to crushing, while the loss of weight by its five-inch cavity is but trifling.

The most important results of the practice may be briefly stated as follows :—In firing for accuracy with the minimum charges mentioned, at a target 2,000 yards distant, with 6° elevation, the shot struck the ground (about 8 feet below the level of the gun) at (5 trials) 2,017, 1,937, 1,902, 1,892, 1,873 yards. The lateral deviations were 1, 3, ⅔, 5 yards to right and 5 yards to left, showing, at this range of 1⅛ miles, a very great accuracy as regards horizontal deviations, to test which the firings were made. The vertical deviations were probably due to varying initial velocities, or perhaps to some difference in the weight of



RODMAN'S MAMMOTH CANNON.

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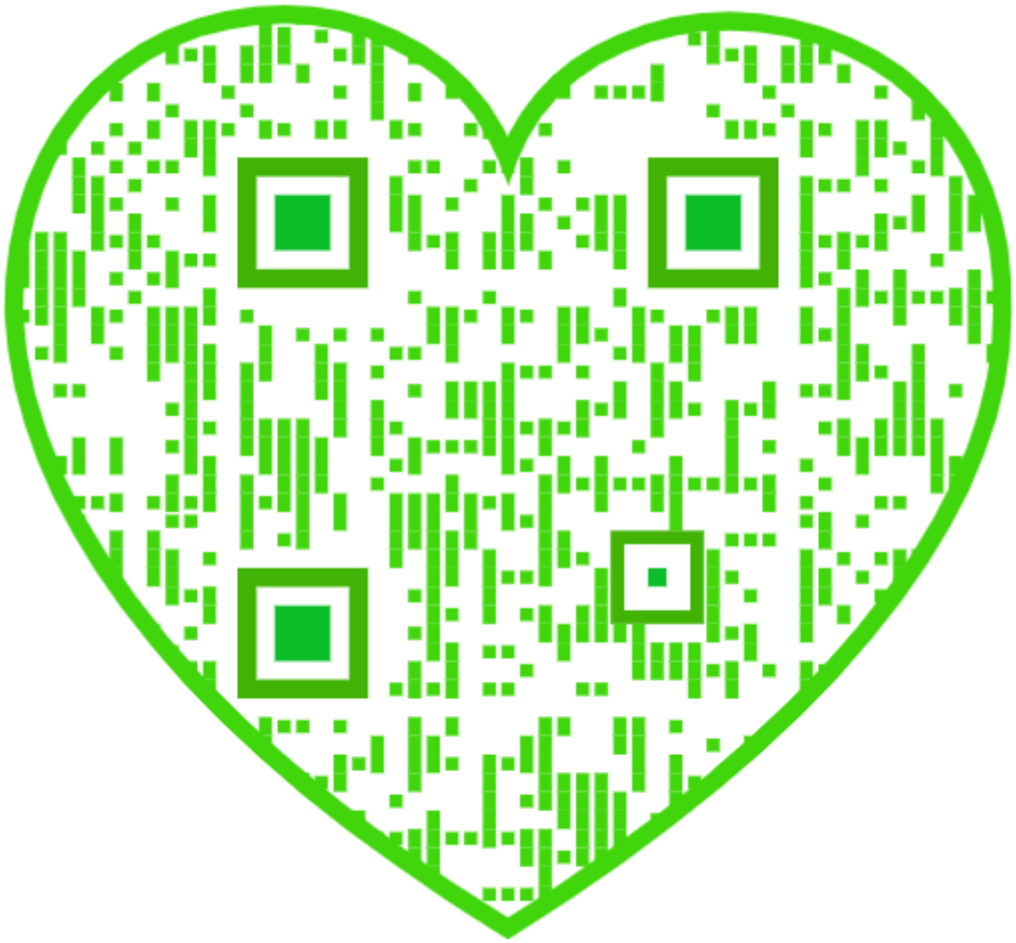


the shells fired. Had the shot been intercepted at the target by a vertical plane, they would have been found included in a vertical extent of about 16 yards—not much over the hight of a three decker.

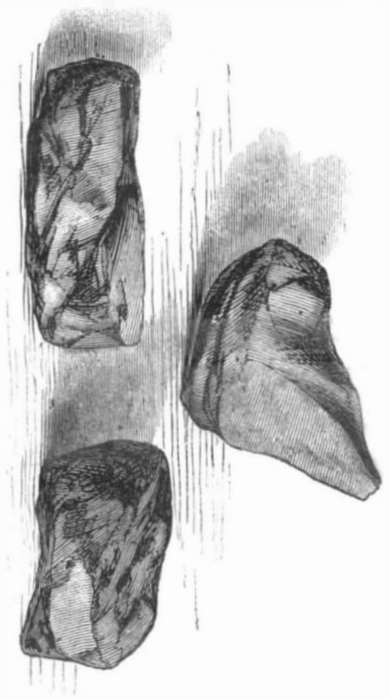
The time of flight in these firings varied from 6½ to 7 seconds, giving an average velocity of about 900 feet per second.

By experiments made for determining the initial velocity, the average was 1,328 feet per second with 40 lbs. of large-grained powder, and 1,282 feet per second with 50lbs. of perforated cake powder.

The ranges with maximum elevation of 28° 35′—shells of 334 lbs. and 50 lbs. of Rodman's perforated cake powder—were as follows:—5,298, 4,950, 5,375 yards.

With 40 lbs. large-grain powder they were 5,435, 5,062, 5,730 yards, and the time of flight 27 seconds.

With 10° elevation, and 40 lbs. large-grain powder, they were 2,700, 2,900, 2,754, 2,760 yards.



**Rodman's Large-Grained Powder.**

These ranges do not exhibit any decided advantage over those obtained from the ten-inch gun up to 10° elevation. Beyond that elevation the gain is considerable, and may be estimated at about 600 yards for the elevation of 28° 35′. With 39° elevation, and a charge of 40 lbs. large-grained powder, it is probable a range considerably beyond 4 miles might be attained. Indeed, the conviction appeared to be general among the officers who witnessed the firings, that the gun could, if necessary, bear much heavier charges, though, for all ordinary uses, it is doubtless best to keep them down to somewhat less than the above.

Such charges produce far less strain on the gun than would otherwise obtain, owing to the nature of the powder used, and described above as "large-grained," and as "Rodman's perforated cake powder." The former differs from common powder only in the size of the grains, which are six-tenth inch cube, and the degree of pressure to which it is subjected in the manufacture. The latter is prepared in solid compressed cakes (subjected to a pressure in the making equal to what they will be subjected to in the gun) and perforated with holes to permit access to the flame They are, I believe, improvements and inventions of Captain R dman, and intended, by retarding the burning, to reduce the excessive strain to which large guns are subject with fine-grained powders, which are inflamed almost instantaneously, and before the heavy projectile is started from its seat. This result is shown by the "pressure gage" attached to the gun, or introduced into its chamber. The comparative initial pressures of the "perforated cake," "large-grained," and common cannon powder, are estimated to have about the ratios of ½, ⅓, and unity. This is a result of very great importance in its bearing upon the practicability of using cast iron guns of extraordinary calibers.

Fifteen inches is the caliber of the gun made as an experiment to test the practicability of casting guns of extraordinary caliber, and their efficiency. The result has convinced our ordnance officers that it is not an extreme limit. A twenty-inch gun can probably be made, and not only made, but used with facility and efficiency. Enormous and expensive as they are, such guns may have their "mission," and a few of them in our important sea-coast batteries will probably be hereafter deemed an essential part of their armament.

## THE WAR.

*Monday, April 29th.*—The country is receiving with great satisfaction the intelligence of a significant vote that was taken this day in the Maryland Legislature. At the extra session of the Legislature held at Frederick, Mr. Wallis, from the majority of the Committee on Federal Relations, to whom was referred the memorial of 216 voters of Prince George's county, praying the Legislature, if in its judgment it possesses the power, to pass an ordinance of secession without delay, reported that in their jugdment the Legislature does not possess the power to pass such an ordinance as is prayed, and that the prayer of the memoralists cannot therefore be granted. The report was adopted without a division being called.

Another event of this day was the meeting of the Congress of the secessionists. This body met at Montgomery, the capital of Alabama, and received a message from their President, Jefferson Davis. The message announced the ratification of the permanent constitution of the Confederate States, and that it only remains for an election to be held for the designation of officers to administer the government. It says the declaration of war made against the Confederation by Abraham Lincoln rendered it necessary to convene Congress to devise means to replenish the treasury and for the defense of the country. Commissioners have been sent to England, France, Prussia and Belgium to ask their recognition as a member of the family of nations and make treaties of amity and commerce. He recommends the appointment of other diplomatic agents. He says the Confederacy, through Mr. Stephen's, its Vice President, has concluded a convention with Virginia, by which Virginia has united her powers and fortunes with the secessionists. He has satisfactory assurances, he says, that other Southern States will soon stake their fortunes with the Confederacy. He also states that most of the Executive Departments are in successful operation. The Postmaster General can soon be ready to assume the direction of postal affairs, &c.

*Tuesday, April 30th.*—Accounts from various portions of the seceded States represent the people as eager for war, though there seems to be a want of arms and equipments. The universal feeling in the extreme South is in favor of an immediate attack on Washington; but in Virginia, where the difficulties of the measure are more clearly perceived, it is declared that no such design is entertained.

The Chief Justice of Vermont was in Richmond on the 27th, and had a full opportunity of judging of the number of the troops there. He estimates them at 11,000, and believes that 15,000 more were south of that point, in motion northward.

The Montgomery correspondent of the New York *Times* writes as follows:—

MONTGOMERY, Ala., April 21, 1861.

For three days the little cannon which acted as spokesman for all the stirring events of the last six months stood loaded and primed, ready to announce the secession of Virginia. At length the news came, and there was a race for the gun. The city was in a frenzy of joy; speeches were made, and the whole city lighted up with bonfires. Virginian residents, who for some time have been rather quiet on the subject of the place of their nativity, regained confidence, exhibited flags from their dwelling houses, and went up in a body on Capitol Hill to fire a salute in honor of their native State. But still more tumultuous were the expressions of joy when the news came in that the Seventh regiment of New York had been defeated, many of them killed, and the rest taken prisoners. It is a pretty hard thing at any time to convince a Southerner that a Yankee has any courage. It is impossible; have they not been defeated twice already by the South? It is now decided to remove the seat of war to Virginia. All other plans are now rendered subservient to the one object, to take immediate possession of Washington. Troops, which a few weeks ago were ordered to Pensacola, are now directed to prepare themselves to march at a moment's notice to Virginia.

The intention of Mr. Davis is to collect, as soon as possible, 50,000 men in different parts of Virginia, in such a manner that they may be suddenly concentrated at Washington on a few days' notice. On Sunday next, about 3,000 troops will set out from this State for Lynchburg. Mr. Davis has assured the soldiers that he will place himself at their head, and he is known to be making personal preparations to leave the city as soon as a sufficient number of troops can be collected. The Cabinet are all here, and are in frequent session, and every day messengers are sent out to hasten the arming and preparation of companies for departure. All nurture the hope that in less than a month Washington will have changed hands, and the whole border will be threatened with Confederate troops. For a man born in the North to express a doubt of the ready fulfillment of these expectations would be a needless exposure of life.

The attention of the whole people is occupied with the preparations for war. Funds are being raised to provide for those families which will be left without means of support by the departure of husbands and brothers to the war. What happens in most countries only after the resources of the State have been reduced after a long war appears here at the beginning—large private benefices are made, individuals offer personal contributions to the Treasury, and take the responsibility of stated supplies. As the war advances, and the income derived from the tariff, which has been supplying the immediate wants of the Treasury, has been cut off by the obstruction of trade, this irregular but uncertain source of revenue will, to be sure, become more necessary, and will be replaced by a heavy direct taxation. Still, the enthusiasm for war is very great.

Commissioners from Missouri have waited on President Davis, and he has kindly accepted the services of troops from that State. Of Southern soldiers, a good deal might be said which space will not allow me to say now. They are brave, reckless, accustomed to the use of arms, and generally capital horsemen, but all that I have seen lack discipline, and that in a way that it is almost impossible to remedy, and all are deficient in muscle—the power of endurance. In an attack which required spirit, I should think they would be strong; but to meet an attack, or anywhere that strong and steady action is required, they are unreliable. Some begin to complain that they are obliged to expose the best blood of the country to the mere superfluous population of the North. "Why," said a captain to me, "my company represents nearly $10,000,000 worth of property, and they have got to fight the Irish and Dutch of the North." Great excitement was caused by what seemed the enormous call of Mr. Lincoln for troops, but all anxiety excited by this was allayed by the expected aid of the border States, whose military resources are thought to be without limit.

From abundant manifestations of public opinion, it is plain that North Carolina and Arkansas will join the secessionists, and probably Tennessee, also; thus completing the tier of States next south of the border Slave States. This division line passes through the State of Virginia, the western portion which borders on the free States—Pennsylvania and Ohio—being decidedly in favor of the Union; while in the eastern portion, which is separated from the free States by Maryland, the sentiment is overwhelming in favor of secession. The only States whose course remains doubtful are the large States of Kentucky and Missouri, the former having a population of 920,077 free and 225,490 slaves, and the latter 1,085,595 free and 115,619 slaves. Governor Magoffin, of Kentucky, has written a letter to the Louisville *Journal*, in which he says that he is making the greatest possible exertion to accomplish two things—one to arm the State, in order that she may be in condition to take with effect whatever course may seem best, and the other to keep her neutral in the contest. In Missouri, 3,000 men have volunteered for the support of the government.

*Wednesday, May 1st.*—The great event of this day is the arrival of the steamer *Atlantic*, bringing authentic intelligence of the ample reinforcement of Fort Pickens, which commands the harbor of Pensacola, Fla. The *Atlantic* is one of the splendid steamers of the old Collins line, and was chartered by government to transport troops and stores for the important purpose which she has successfnlly accomplished. She left this port on Sunday, April 7th, under sealed orders, and arrived at Pensacola on the 16th. It was found that Fort Pickens had been moderately reinforced by the *Brooklyn* on the 12th of April. The *Atlantic* left additional forces and an ample supply of provisions; rendering this important post entirely secure.

Sergeant Brody, who has served twenty-five years in the army, was sent on board the *Brooklyn* and placed in double irons. He is accused of corresponding with persons in the Confederate States' service, with intent to permit Fort Pickens to be entered at night while he was sergeant of the guard, by the Southern troops, and thus fall into their hands. A number of guns at Pickens have been found to contain oiled putty, fat, &c., behind the cartridges, and others have had the loads drawn. It seems that General Bragg stooped to bribe the sentinels who were assigned to duty on the night of April 12th. Promises of money and of place won them over to the plot, and had it not been for the reinforcements from the *Brooklyn*, which were happily thrown into the fort on the day preceding, 500 men, picked from the 6,000 Southern army behind the batteries along Pensacola Bay, would have butchered the feeble and surprised garrison of Pickens in cold blood. The frustration of this characteristic plot, a correspondent

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of the Mobile *Register* wrote, was attributable to the "treachery" of Captain Adams, then in command of the United States vessels, an old friend of General Bragg, in whom he placed the utmost confidence."

*Thursday, May 2d.*—The greatest evils of the war fall upon the Border States, where the sentiment is divided, a portion of the inhabitants being in favor of the Union, and a portion in favor of the secessionists. It is supposed that the preponderating feeling in St. Louis is on the side of the Union; still, it was thought that a secession mob might be raised to plunder the arsenal in that city, and it was therefore determined to remove at least a portion of the arms which it contained to Illinois. We received, several days since, brief statements by telegraph that this was successfully accomplished, and we have now full particulars of the operation in a special despatch from Springfield, Ill., to the Chicago *Tribune*. It was the most brilliant feat yet performed.

SPRINGFIELD, Ohio, April 28, 1861.

I am now able to give a complete and accurate narrative of the transfer of the 21,000 stand of arms from St. Louis to Springfield.

Captain James H. Stokes, of Chicago, late of the regular army, volunteered to undertake the perilous mission, and Governor Yates placed in his hands the requisition of the Secretary of War for 10,000 muskets. Captain Stokes went to St. Louis, and made his way as rapidly as possible to the arsenal. He found it surrounded by an immense mob, and the postern gates all closed. His utmost efforts to penetrate the crowd were for a long time unavailing. The requisition was shown. Captain Lyon doubted the possibility of executing it. He said the arsenal was surrounded by a thousand spies, and every movement was watched and reported to the headquarters of the secessionists, who could throw an overpowering force upon them at any moment. Captain Stokes represented that every hour's delay was rendering the capture of the arsenal more certain; and the arms must be removed to Illinois now or never. Major Callender agreed with him, and told him to take them at his own time and in his own way. This was Wednesday night.

Captain Stokes had a spy in the camp, whom he met at intervals in a certain place in the city. On Thursday, he received information that Governor Jackson had ordered 2,000 armed men down from Jefferson City, whose movements could only contemplate a seizure of the arsenal by occupying the hights around it and planting batteries thereon. The job would have been an easy one. They had already planted one battery on the St. Louis levee, and another at Powder Point, a short distance below the arsenal. Captain Stokes immediately telegraphed to Alton to have the steamer *City of Alton* drop down to the arsenal landing about midnight. He then returned to the arsenal, and commenced moving the boxes of guns, weighing some 300 lbs. each, down to the lower floor.

About 700 men were employed in the work. He then took 500 Kentucky flint-lock muskets, which had been sent there to be altered, and sent them to be placed on a steamer as a blind to cover his real movements. The secessionists nabbed them at once, and raised a perfect Bedlam over the capture. A large portion of the outside crowd left the arsenal when this movement was executed: and Captain Lyon took the remainder, who were lying around as spies, and locked them up in the guardhouse. About 11 o'clock the steamer *City of Alton* came alongside, planks were shoved out from the windows to the main deck, and the boxes slid down. When the 10,000 were safely on board, Captain Stokes went to Captain Lyon and Major Callender, and urged them, by the most pressing appeals, to let him empty the arsenal. They told him to go ahead, and take whatever he wanted. Accordingly he took 11,000 more muskets, 500 new rifle carbines, 500 revolvers, 110,000 musket cartridges, to say nothing of the cannon and a large quantity of miscellaneous accouterments, leaving only 7,000 muskets in the arsenal to arm the St. Louis Volunteers.

When the whole were on board, about 2 o'clock on Friday morning, the order was given by the captain of the steamer to cast off. Judge of the consternation of all hands when it was found that she would not move. The arms had been piled in great quantities around the engines to protect them against the battery on the levee, and the great weight had fastened the bows of the boat firmly on a rock, which was tearing a hole through the bottom at every turn of the wheels. A man of less nerve than Captain Stokes would have gone crazy on the spot. He called the arsenal men on board, and commenced moving the boxes to the stern. Fortunately, when about 200 boxes had been shifted, the boat fell away from the shore, and floated into deep water. "Which way?" said Captain Mitchell, of the steamer. "Straight to Alton in the regular channel," replied Captain Stokes. "What if we are attacked?" said Captain Mitchell. "Then we will fight!" said Captain Stokes. "What if we are overpowered?" said Captain M. "Run her to the deepest part of the river and sink her!" said Captain S. "I'll do it!" was the heroic answer of Captain Mitchell; and away they went past the secession battery, past the entire St. Louis levee, and on to Alton in the regular channel, where they arrived at 5 o'clock in the morning.

When the boat touched the landing, Captain Stokes, fearing pursuit by some two or three of the secession military companies by which the city of St. Louis is disgraced, ran to the market house and rang the fire bell. The citizens came flocking pell-mell to the river, in all sorts of habiliments. Captain Stokes informed them of the situation of things, and pointed out the freight cars. Instantly men, women and children boarded the steamer, seized the freight, and clambered up the levees to the cars. Rich and poor tugged together with might and main for two hours, when the cargo was all deposited in the cars, and the train moved off, amid their enthusiastic cheers, for Springfield.

The blockade of the Southern ports which had been proclaimed by the President is commenced; Norfolk, in Virginia, being closed to all vessels by the commander of Fortress Monroe. The Mississippi river is also closely watched by a force at Cairo, which examines all steamers, and allows no arms or munitions of war to be carried south of that point. The steamboat *C. E. Hillman*, with $175,000 worth of arms and munitions of war, consisting of powder, cartridges and lead, purchasad at St. Louis and destined for Nashville, Tenn., was seized on April 26th.

A dispatch from Raleigh, N. C., says the Legislature met on the 1st inst. The Assembly speedily organized. A bill calling a convention to assemble on the 20th was unanimously passed. There was no reference of its action to the people. The Southern Confederacy flag floats over the Capitol. North Carolina is virtually out of the Union. The Governor has organized a camp of instruction at Raleigh. He recommends the raising and organizing of ten regiments to serve during the war.

*Friday, May 3d.*—The President of the United States issued a proclamation on the 3d of May calling out 42,034 volunteers to serve three years unless sooner discharged, also directing the increase of the regular army by the addition of eight regiments of infantry, one of cavalry, and one of artillery, amounting to 22,714 officers and men; and further directing the enlistment of 18,000 seamen in the navy. This makes an aggregate of 82,748 men, in addition to the 75,000 militia called out on the 15th of April, for three months.

The importance of a long period of enlistment has been taught to our authorities, by experience in previous wars. In the Revolution, the war of 1812, and the Mexican war, our military operations were always embarrassed by the terms of the enlistment of the troops expiring in the midst of the war. It seems that the trouble is now to be avoided.

*Saturday, May 4.*—The bridges on the railroads leading from Baltimore to Philadelphia, and from Baltimore to Harrisburg, which were burned by the Secession mob of Baltimore, are being repaired, the inhabitants in the vicinity rendering such aid as they can.

*Sunday, May 5th.*—Two regiments, with the Boston Flying Artillery, left Annapolis this morning by order of General Butler, and proceeded to the Relay House to hold that position. It is the junction of the Baltimore and Ohio and Washington Railroads, and within eight miles of Baltimore. All the cars from Harper's Ferry must pass this point to reach Baltimore, so that all communication with that city is cut off, as General Keims, with his command advancing on the Northern Central Railroad from Harrisburg, controls that route, and the government having stopped all communication by way of the Susquehanna, and General Butler, commanding a force that will be landed from a fleet in Baltimore harbor, controlling all communication with Baltimore by sea, completely invests the city.

Intelligence of the arrival of the first detachment of these troops is given in the following dispatch to the Associated Press:—

BALTIMORE, Md., May 5, 1861.

This morning Knox Clifford, overseer of James H. Luckett's farm at the Relay House, attempted to cross the bridge over the Patapsco at that point, and was met by guards of United States troops, who prevented his crossing. Soon afterward, thirty cars arrived from Washington, with nearly eighteen hundred troops, said to be the Eighth Regiment, of New York, and the Sixth, of Massachusetts, under command of Brigadier-General Butler. There was intense excitement at the Relay House, and many of the inhabitants, frightened, foolishly left, coming to this city. The troops were followed by their camp equipage, and had, beside muskets and small arms, several cannon and howitzers. They took possession of Mr. Luckett's and Talbot's farms, established a camp, and announced that if any hostile demonstration was made, they should fortify the neighboring hights. The troops are said to have cut down the telegraph poles on the line west of Relay, so as to prevent communication between Baltimore and Harper's Ferry. The Baltimore and Ohio Railroad is also held, to prevent forwarding supplies to secession troops in Virginia. It is believed here that the road from Wheeling will be taken possession of for the same purpose, and soon secession troops will hold the road only from Harper's Ferry to Martinsburgh. The troops this afternoon were drilling at the Relay. Their approach is said to have been so quiet and stealthy that the first the telegraph operator knew of it was when the guard came in and took possession. The news is not generally known here, but so far as it has been announced, it has been received with satisfaction, except among the National Volunteers, who attacked the Massachusetts troops, and they feel themselves powerless to resist.

*Monday, May 6th.*—The administration has published the correspondeuce between Mr. Faulkner, Minister to France under Buchanan's administration, and the Secretary of State, with the instructions of our government to the new Minister to France. In the latter the policy of the administration is announced in the following decided terms:—

You cannot be too decided or too explicit in making known to the French government that there is not now, nor has there been, nor will there be any—the least—idea existing in this government of suffering a dissolution of this Union to take place in any way whatever. There will be here only one nation and one government, and there will be the same Republic and the same constitutional Union that have already survived a dozen national changes and changes of government in almost every other country. These will stand hereafter, as they are now, objects of human wonder and human affection. You have seen, on the eve of your departure, the elasticity of the national spirit, the vigor of the national government, and the lavish devotion of the national treasures to this great cause. Tell M. Thouvenel, then, with the highest consideration and good feeling, that the thought of a dissolution of this Union, peaceably or by force, has never entered into the mind of any candid statesman here, and it is high time that it be dismissed by statesmen in Europe.

I am, sir, respectfully your obedient servant,

WM. H. SEWARD.

To WILLIAM L. DAYTON, Esq., &c., &c.

Regular railroad communication between Washington and Philadelphia is to be opened to-day; the trains are to start from both cities at 10 A. M. and 6 P. M., and pass through Baltimore.

### Patents in the Seceded States.

Jefferson Davis, in his message to the Congress of the Confederate States, on the 29th ult., uses the following language in regard to establishing a Patent Bureau:—

I refer you to the report of the Attorney General, and concur in his recommendation for immediate legislation, especially on the subject of patent rights. Early provision should be made to secure to the subjects of foreign nations the full enjoyment of their property in valuable inventions, and to attend to our own citizens' protection, not only for their own inventions, but for such as may have been assigned to them, or may hereafter be assigned by persons not alien enemies.

The Patent Office business is much more extensive and important than had been anticipated. The applications for patents, although confined under the law exclusively to citizens of our confederacy, already average seventy per month, showing the necessity for the prompt organization of a bureau of patents.

It would appear from the number of patents sought per month in the Confederacy, that inventive talent has suddenly sprung up among the Southern people; but when we consider that no government fee is charged for registering applications for patents, it will be understood that many will file drawings and descriptions of almost any well known invention which has been patented in the United States, in the hope that, when the Patent Bureau is established, their applications being foremost, such claims will be made secure to them, which is very doubtful. This will explain where the seventy applications per month for patents came from.

GREENHOUSE PLANTS IN ROOMS.—The various greenhouse plants which are kept in rooms require a constant supply of water, which should always be applied on the tops of the pots, and from no consideration whatever should any be suffered to remain in the water pans or saucers under the pots, and they must also be kept clean from dead leaves, &c. They must be fumigated when there is any appearance of insects. With respect to air, the plants should have a good share in fine, warm weather. It is a very common practice to open the under sash window where the plants stand; when thus exposed to the draft, it injures them more than if they were entirely exposed to the open air. When they begin to grow long and spindling, the tops of the shoots should be nipped off with a pair of scissors, which will cause them to become thick and bushy.

HINTS TO THE VOLUNTEERS.—Do not wear cotton stockings; your feet will be blistered by a six hours' march. Wear woolen stockings, and if you can find the means to dip the soles in melted tallow before starting your feet will not be blistered at all.

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### The Dahlgren Howitzer.

In the recent brief mention of our visit to the Washington Navy Yard, it will be remembered that we spoke of the surprise of Mr. Russell, the famous correspondent of the London *Times*, at the rapidity of the practice with Dahlgren's howitzers. We now present an illustration of this remarkably efficient piece of ordnance. The howitzer was suggested by the experience of the Mexican war, and is designed especially for operations against an enemy having an extensive sea coast and no navy, which can only be attacked either in shallow water or on land.

For these operations, boats of light draft are needed, and with them, guns combining the greatest possible power with the least possible weight. This happy combination has been achieved by Captain Dahlgren, in his howitzer, which is now generally adopted in the American navy.

The Dahlgren howitzers are of three classes, viz:—the twenty-four pounders, weighing about one thousand three hundred pounds, adapted for the launch of a seventy-four gun ship; the twelve-pounder, weighing seven hundred and fifty pounds, designed for a frigate's launch; and the twelve-pounder, weighing four hundred and thirty pounds, designed for the launch of a sloop of war. In their design the utmost simplicity of figure has been chosen, and all ornament avoided. Around the charge, the bronze is distributed in the form of a cylinder, extending sufficiently in front of the seat of the projectile, thence to the muzzle it is continued as a truncated cone. The breech-plate is a portion of a sphere. The bore is terminated by a conical chamber, which affords the greatest facility for rapid loading, without incurring the least chance of the charge being detained when sent home by the rammer. The howitzer is mounted by a loop similar to that of a carronade. The elevation is performed by a screw passing through the escabel knob, worked by a light disk attached just below the thread of the screw. Its edge is coarsely milled, so as to afford a firm touch to the hands. The lock is a plain hammer, perforated at the head, so as to admit free egress to the blast from the vent. A round tangent sight is made to move in a perforation drilled in the rear of the base ring. The projectiles used in howitzers are shells and canister, to which is now added shrapnels.

CAPTAIN JOHN A. DAHLGREN'S HOWITZER.

When it is necessary to land men and howitzers for operation on shore, the guns are attached to light but strong carriages, such as shown in our illustration. The field carriage is of wrought iron, of the lightest possible weight. The trail has a small wheel or runner, to ease it over any obstacle. Its entire weight does not exceed five hundred pounds. The parts of the carriage are fastened together by screwnuts, and can be taken apart and put together with the greatest rapidity.

These Dahlgren howitzers can be readily manouvered by the ordinary launches' crews, and may now be deemed a most effective and efficient arm of the naval service.

Captain John A. Dahlgren was born in Pennsylvania. He entered the service on the 1st of February, 1826, and his present commission bears the date of 1855. He is at present retained on special ordnance duty.

### European Wars.

By the latest news from Europe, we learn that the "Old World" also appears to be in warlike commotion. Great preparations are making to increase the armies and navies of the different powers, and fears are entertained that a general European war is at hand. In a recent communication to the Boston *Commercial Bulletin*, Donald McKay states that the Emperor of France has ordered ten new iron-clad frigates like *La Gloire* to be constructed as soon as possible. In England the *Warrior* and the *Black Prince*—the two largest mail-clad frigates ever designed—are in a forward state; and the two others—the *Defense* and the *Resistance*—are also progressing rapidly. Austria has just commenced the construction of two such frigates, and Russia, four. Mr. McKay states that during his visits to the French and English navyyards, last summer, he had frequent opportunities of examining the construction of iron-cased steam frigates, and he assisted in several experiments to test the resisting power of armor plates. In view of this personal experience, he says: "I do not hesitate to risk my reputation as a mechanic of some experience in stating that no ships constructed on the old system are capable of sustaining a fifteen minutes' fight with one of these invulnerable monsters, without being blown up."

He believes that Pennsylvania iron is of a very superior quality for making ship armor, and that we

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ought to have at least six of such iron-cased frigates, carrying 36 guns each.

The *Warrior* and the *Black Prince* are to have very powerful engines, so as to give them a speed that will surpass that of any war vessel afloat. The London *Engineer* states that each frigate will have engines of the nominal power of 1,260 horses, but an actual power of 6,000 horses. The engines have cylinders of 112 inches diameter, the largest ever made for steamers. The stroke is 4 feet; number of revolutions per minute, 50; making the speed of piston, 400 feet per minute.

### The Seventy-first Regiment.

THE JOURNEY FROM ANNAPOLIS TO WASHINGTON.

We glean the following account of the journey of the Seventy-first Regiment from Annapolis to the capital from the columns of the Washington *Star* of Saturday, April 27th :—

Yesterday afternoon, through the courtesy of Colonel Stone, the efficient commander in charge of the Washington Branch railroad, we were permitted to make a trip out to the Annapolis Junction, on the special train sent out for the New York Seventy-first Regiment. The train consisted of sixteen large cars, and carried out the Northern mail, a number of iron rails for replacing any that might have been torn up, and several barrels of bread, crackers, sugar, &c., together with a large amount of salt meat for the troops now daily arriving at the Junction. Leaving the depot about 4½ p. m., with a rifleman upon the locomotive, we steamed out toward the secession region at a rapid rate. Everything was all right along the whole route, and there was nothing to betoken any hostile designs either upon the railroad or the troops. Just beyond Bladensburg we passed the first guard stationed to protect the road, and from there to the junction we were but little of the time out of sight of the gleaming bayonets of Uncle Sam's protectors. The guards seemed to be enjoying themselves hugely, and had fixed up neat little booths to protect them from the sun and the dew; while as we darted over the streams we caught glimpses of some of the chaps who had gone down to bathe, and were having a jolly time paddling in the clear water. Having watered our steam horse at Beltsville, and given a cheer for a couple of loyal sprigs of Young America who lustily waved diminutive gridironsfrom the fence as we darted by, we soon fetched up at the Junction, where were awaiting the Seventy-first Regiment of New York, a Pennsylvania regiment, and five companies of the Massachusetts Fifth Regiment.

The Seventy-first, with their regimental band, filed up to the train, and in a twinkling deposited themselves and their baggage therein. Nothing could be more interesting than the scene toward midnight. About the train all was quiet and still, save the measured tread of the sentries; the camp fires of the other regiments flared fitfully up in the gloom of the forest; the plaintive notes of the whippowil rang out sweet and clear, mingling with the subdued laugh around the fires; while now and then a signal rocket from the enemy would stream up into the sky from the adjacent hills, and falling in a glittering shower, vanish in the darkness. About 2 o'clock there was a sudden concussion, then a tremor along the train, and with a jerk that threw everybody endways, the boys woke to the pleasurable consciousness of feeling the train in motion. This, however, proved to be nothing more than backing on to the switch; and all hands settled down to sleep until, just as the first purple blush of day dawned over the tree tops, the remainder of the Fifth Massachusetts Regiment filed in, and away we steamed for Washington. As we came down the track, the guards were relieved, filling up the platforms and the tops of some of the cars, and all reported right except in one place, where the guard had found, a few moments before, a heavy rail and a large pile of stones placed upon the track. As we neared the city, hats and handkerchiefs were raised by early risers.

The Seventy-first expected to have to cut their way through Maryland to the capital, and the first night took every precaution to guard against surprise. The front, middle and rear ranks each carried with them a bugle, with which to sound an alarm, and scouts were kept out in front, at the sides and in rear. Nothing occurred to interfere with their march, and their next night was spent perfectly at ease. They express great pleasure at the friendly treatment received from the people of Maryland, and believe if their motives in coming to Washington were fully understood, they could march through Baltimore unmolested.

The men are fine-looking specimens of the American soldier, their uniforms neat and clean, their deportment unexceptionable, and their powers of endurance admirable. They marched all the way from Annapolis to the Junction on two biscuits apiece, and only had two more for their supper yesterday when they got there; and yet there was not a murmur heard in the ranks, and when the halt was ordered, and the roll called, not a man was found to be missing. No stragglers or sick had to be waited for. This is an almost unprecedented exploit.

### Army Beverages.

It has been discovered by experience, that soldiers on field and camp duty require some cheering beverage, and since it has been ascertained that alcoholic beverages are injurious, the question arises "What can be substituted for them." We have very useful and practical information on this head from Colonel Dawes, an experienced Indian officer. He recommends that coffee and tea should take the place of liquors, and says "care should be taken to have good coffee and tea provided regularly in each troop and company, and every man should have some offered to him, the first thing in the morning before doing duty, and also some in the evening. When properly managed this practice is alike beneficial to health and morals." A very distinguished surgeon in the Indian army states that from long experience in tropical climates, with soldiers in barracks and in the field, he observed that "a cup of warm coffee taken in the morning tended to prevent sickness."

During the Crimean war, it was found that when the soldiers obtained warm coffee, they sustained fatigue, and were comparatively healthy; but when they were in the trenches, and could not get warm tea or coffee, they were very subject to dysentery.

### Virginia in with Them.

This ancient commonwealth having seceded, has formed a provisional copartnership with the Confederate States, one of the conditions being that, "whatever expenditures of money, if any, said commonwealth of Virginia shall make before the union, under the provisional government, as above contemplated, shall be consummated, shall be met and provided for by said Confederate States."

The people of Virginia are to vote on the secession question on May 24th, and it is asserted that it will be affirmed by over 100,000 majority. We have no doubt of it; a perfect reign of terror exists in the eastern part of the State, and it would cost a Union man his life to vote against secession. In the western part of the State, things are different, and measures are on foot to form a provisional government with a view to a separation from the State.

THE WAY THE PENNSYLVANIA DUTCHMEN FIGHT.—The Philadelphia *Ledger* says that when the Berks county and other interior troops were on their way to Camp Curtin, the officers had a conference over the news of the taking of Fort Sumter, and the fact that, after 36 hours' cannonading, no life was lost. One honest Dutch officer could not understand how this could be done; but another officer, better posted in modern warfare, assured him that it was all owing to the astonishing improvements in modern science, which had made the art of war so perfect that forts might be battered down, and cities be bombarded, and yet not a single individual be killed. The honest Dutch son of Mars listened attentively and in surprise at such remarkable results. Suddenly his face reddened, and with a blow of his fist upon the table, which sounded like the discharge of a columbiad, he exclaimed: "Den, by tam, dey had petter not pring town our Dutchmans, for dey are so tam shtupid mit science dat dey could not go into a fight mitout killing somepody!"

PAY OF VOLUNTEERS.—The terms of service required of volunteer militia is two years, unless sooner discharged. The following is the pay of volunteers :—Sergeant major, quartermaster sergeant, principal musicians, chief bugler, $21 per month; first sergeant of company, $20; corporals, $13; buglers and musicians, $12; privates, $11.

### The Enfield and Minie Rifles.

In these "piping times of war," we see a great deal in print and hear much nonsense talked about the Enfield and Minié rifles. It is most generally supposed that the Enfields and Minié's are peculiar rifles, the one French and the other English, both invented by men whose names have been given to these firearms. The Enfield derives its name from the place where it is made, namely, the government armory at Enfield, England, and it is in most respects like the American army rifle made at Springfield, Mass. The barrel of it is formed of the best charcoal iron; its length is 39 inches; bore, .580 of an inch; it has three grooves, $\frac{1}{16}$ of an inch wide and 500th of an inch deep. The pitch of the grooves is 6 feet 6 inches. A hollow conical ball, with a plug of boxwood placed in the base, is used for this rifle. A graduated back sight, set for ranges from 200 to 1,000 yards, is fixed on all the Enfields.

The Minie rifle derives its name from Lieutenant Minié, of the French infantry, who first applied the hollow expanding bullet to the army rifle, and by whose exertions it was first brought into actual army use. The French rifles have four grooves, of .02758 inches in width, .00788 in depth, and one turn in 6 feet. The bullet is hollow and conical, and weighs 494 grains; no wedge is now used. Formerly, elevating sights were fixed on all the French army rifles, but these have been dispensed with so as to render the arms more simple. The back sight of the rifle is elevated at .78 of an inch above the barrel. A French soldier of the line aims at the waistband of the foe, and with his fixed rifle-sight he is sure to strike him within or at 280 yards distant. When firing at a greater distance, he uses his thumb nail for a back sight, by placing it across the barrel, and by long practice in judging of distances by the eye, he obtains wonderful precision in his aim. The special corps of Chasseurs and Zouaves have elevating sights on their rifles.

FLAG AT THE TOP OF GRACE CHURCH SPIRE—DARING ADVENTURE.—For several days a flag has been floating from the tower of Grace Church, just at the base of the spire. The vestry, however, were anxious that another should surmount the top of the spire, where the gilt cross stands, at a hight of 260 feet from the ground. Several persons undertook the dangerous feat, but on mounting by the interior stair-case to the highest window in the steeple, thought they would scarcely have nerve enough to undertake it. At last William O'Donnell and Charles McLaughlin, two painters in the employ of Richard B. Fosdick, of Fifth Avenue, decided to make the attempt. Getting out of the little diamond-shaped window about half way up, they climbed up the lightning rod on the east side of the spire to the top of the spire. Here one of the men fastened the pole securely to the cross, although quite a gale was blowing at the time. The flag thus secured, the daring young man mounted the cross, and taking off his hat, bowed to the immense crowd that were watching his movements from Broadway. As the flag floated freely in the air, they burst out into loud and repeated cheers.

VALUE OF AMERICAN PATENTS.—There is no country in the world where patents, as a rule, are so valuable as in the United States, as there are none in which inventors are so liberally dealt with as they are there under the new law. Says an American exchange:—"It is not every patentee who is as successful in coining money from his invention as McCormick on reaping machines, Morse on the telegraph, Goodyear on india-rubber, Peeler on the plow, Howe on the sewing machine, Bigelow on carpet looms, Burr on hat machines, or Colt on firearms, beside many others we might name who have amassed fortunes from their patents; but, as a general thing, the patentee who manages his invention with any ordinary degree of enterprise can usually realize a competence from his patent." This statement is literally true, and if the European inventors do not take advantage of the liberal provisions of the new law, they will only have themselves to blame.—*London American.*

MARYLAND.—By the census of 1860, the population of Maryland is :—Free, 646,183; slave, 85,385; total, 731,568. The area of the State is 9,356 square miles. New Hampshire contains 7,280 square miles; Massachusetts, 7,800; New York, 47,000.

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### Temperance Among Soldiers.

It was at one time generally believed that the use of alcoholic liquors was positively necessary and beneficial to all men, and especially soldiers and sailors on active duty. Physicians recommended such beverages, and regular daily rations of rum were provided in all armies and navies. These notions are still entertained by many persons, and very generally there is a want of correct information on the subject. It is very common for soldiers of all classes to indulge in the use of alcoholic beverages; and we witness daily their prevalent and injurious use among the volunteers in our city. A few words of advice on this topic may be of great benefit to them.

By close observation and many experiments, it has been found that the tissues and the blood of drunkards, as well as those who continually tipple in beer and whisky, but do not get drunk, are generally in a state of degeneration. Alcohol passes into the blood and retards the elimination of waste and injurious matter from the body, and thus it tends to produce disease, especially fever. French physicians have determined that the blood of a man who drinks a pint of brandy per day is never free from alcohol, and they assert that its presence in the blood exerts a most prejudicial effect upon nutrition. A man in ordinary health, they assert, requires no alcohol; it is only useful in a medicinal sense, taken in moderate doses.

It was long supposed by the British physicians that spirituous liquors imparted to soldiers in India a power to resist the depressing influences of a tropical climate; hence it was a regular practice to provide each soldier with a ration of spirituous liquor before partaking of breakfast. This custom led to the demoralization of the army, by affording a temptation to general drunkenness, which led to the increase of crime and disease. This has resulted in the abolition of the spirit rations in the entire Indian army, with a manifest improvement in the health and morals of the soldier. An experienced Indian medical officer states that the use of spirits in warm climates tends to make men furious and produce delirium tremens, and he recommends the total absence of wines and spirits in the army. Colonel Dawes, of the Bengal Artillery, states that his experience in India has led him to see into the terrible evils of the use of spirituous liquors among soldiers, even in moderate quantities. He has witnessed the best men become useless from an indulgence in liquor; while, on the other hand, he has seen men of bad characters converted into able-bodied, hard-working, courageous soldiers by abstaining from drinking spirits. When the Thirteenth Regiment of Light Infantry was beleaguered in Jellalabad for five months, during which they could obtain no spirituous liquors, they were remarkably healthy and cheerful, and behaved with great courage and good temper. After the garrison was relieved, they then obtained plenty of liquor, and the result was much insubordination and disease. Major General Wylie, of the Bombay army, testifies that when the soldiers were quartered in districts where no spirituous liquor could be obtained, no crimes were committed, their health was good, and discipline admirable; but whenever they obtained and were supplied with a great deal of spirits, ill conduct and disease prevailed to a frightful extent.

This information, we trust, will exert a salutary influence upon the officers and soldiers of our army.

### Build Iron-Plated War Sloops.

In the Scientific American of December 1, 1860, we earnestly endeavored to impress upon the minds of our naval authorities and members of Congress the imperative necessity of immediately providing for the building of small war ships. Had our advice, when given, been promptly acted upon, several of such vessels might now have been nearly completed at establishments in Philadelphia, New York and Boston. But the past cannot be recalled; the present is the time for action; and we advise that several strong timber-built propellers of light draft be covered with thick plates of puddled steel, for the purpose of acting as coasting gun sloops. Their engines should be powerful, so as to give them great speed to overhaul and run down and sink the swiftest privateers. The naval tactics of such vessels should be very simple in dealing with such piratical craft. If properly constructed, they can be fired at without injury, therefore they should never mind the guns of the privateers, but steam right on and crush down the enemy.

These vessels can also attack forts with success; whereas we have not a single frigate in our navy at present that could stand twenty minutes before any battery firing shell. During the Crimean war the Russian fort and strong batteries of Kinburn were destroyed, and every cannon silenced, in about one hour's time, by the two French iron floating batteries, *Lane* and *Tunnante*. Here is an example for us to follow. We think that there are a number of establishments in our country that could build several such vessels in the course of six weeks. When the enthusiasm of our people is aroused, their capacity for performing labor is remarkable. During the war of 1812, Henry Eckford built several very effective war vessels for the government in a few weeks. We have now fifty times the capacity for building vessels and engines rapidly that we had fifty years ago. All that is wanted is the "word of command," and the national energy directed in the proper channel.

### General Butler and Governor Hicks.

His Excellency Governor Hicks, of Maryland, wrote a note to the Commander of the Massachusetts troops, General Butler, as follows:—

Sir:—Having, by virtue of the powers vested in me by the Constitution of Maryland, summoned the Legislature of the State to assemble on Friday, April 26, and Annapolis being the place in which, according to law, it must assemble; and having been credibly informed that you have taken military possession of the Annapolis and Elk Ridge Railroad, I deem it my duty to protest against this step; because, without at present assigning any other reason, I am informed that such occupation of said road will prevent the members of the Legislature from reaching this city.

Very respectfully yours,
(Signed) Thomas H. Hicks.

To which General Butler replied as follows:—

Headquarters, U. S. Militia,
Annapolis, Md., April 23, 1861.

*To His Excellency Thomas H. Hicks, Governor of Maryland:*—

You are credibly informed that I have taken possession of the Annapolis and Elk Ridge Railroad. It might have escaped your notice; but at the official meeting which was had between your Excellency and the Mayor of Annapolis, and the committee of the government and myself, as to the landing of my troops, it was expressly stated, as the reason why I should not land, that my troops could not pass the railroad, because the company had taken up the rails, and they were private property. It is difficult to see how it can be, that if my troops could not pass over the railroad one way, the members of the Legislature could pass the other way. I have taken possession for the purpose of preventing the execution of the threats of the mob, as officially represented to me by the master of transportation of the railroad in this city, "that if my troops passed over the railroad, the railroad should be destroyed."

If the government of the State had taken possession of the road in any emergency, I should have long hesitated before entering upon it; but as I had the honor to inform your Excellency in regard to another insurrection against the laws of Maryland, I am here armed to maintain these laws, if your Excellency desires, and the peace of the United States, against all disorderly persons whatsoever. I am endeavoring to save, and not to destroy; to obtain means of transportation, so that I can vacate the capital prior to the sitting of the Legislature, and not be under the painful necessity of incumbering your beautiful city while the Legislature is in session.

I have the honor to be, very respectfully,
Your Excellency's obedient servant,
(Signed) B. F. Butler, Brig. Gen'l.

### Forces Already in the Field.

The New York *World*, of Wednesday, April 30th, has a detailed statement of the several regiments already reported, from which the following summary is formed:—

RECAPITULATION.

| | |
|---|---|
| Number of men on the way to Washington | 29,325 |
| Number of men ready for transportation | 23,000 |
| Number of men preparing for transportation | 21,070 |
| Number of men to arrive to-day | 1,000 |
| Total | 74,395 |

In addition to these, there are—

| | |
|---|---|
| 8 regiments forming in Maine, each 1,000 strong | 8,000 |
| In New Hampshire, 5 regiments, each 1,000 strong | 5,000 |
| In Vermont, 5 regiments, each 1,000 strong | 5,000 |
| In Connecticut, 3 regiments, each 1,000 strong | 3,000 |
| Making a grand total of | 95,395 |

This leaves out the large quota to be furnished by the Western States, about which we have as yet no definite information. The number from the West and Northwest now forming into regiments would doubtless swell the number to 150,000 men. It is safe to conclude that through the East, the North and the Northwest, including California and Oregon, a quarter of a million of men, comprising the best blood of the country, are ready to respond to the call of arms, and that they could be brought into the field as soon as the necessary arms and equipments could be provided them.

Baltimore is the largest city in the Southern States, having a population of 214,037. The population of New Orleans is 170,766, and that of St. Louis 161,000.

### The Fire of Fort Sumter.

The latest Charleston papers contain detailed accounts of the damage done by Fort Sumter to Fort Moultrie and surrounding property. These give a pretty good reason for the anxiety of the rebels to have Major Anderson stop his fire, and for their allowing him to dictate the terms upon which he would evacuate the fort.

We clip the following from the Charleston *Courier* of April 20th:—

FORT MOULTRIE.

The raking fire from Fort Sumpter against Fort Moultrie was terribly destructive, and when viewed in connection with the fact that no life was lost, is the most extraordinary case ever recorded in history. As you enter, the eye falls upon the battered walls of the archway, with openings in some places large enough for windows. In other places may be seen the hanging splinters of the rafters, large pieces of ceiling seemingly about to drop, while the holes in the roof throw a clear light over the scene of destruction, which renders it painfully impressive. It would be an almost impossible task to count the number of balls discharged at this devoted fortress. All of the officers' quarters were battered with seven, eight or ten balls, which penetrated the whole length of the building. The western wall on the upper balcony was entirely shot away. The barracks were almost entirely destroyed. The furnace for heating hot shot was struck four times; the flag of the Confederate States received three shots, and the Palmetto flag four—a rather singular circumstance when viewed in connection with the seven Confederate States. The merlons of sand bags, &c., remain unbroken.

On the outside walls we counted over one hundred shots. Laborers were engaged in clearing away fallen bricks, &c. It will be necessary to pull down the old walls and rebuild anew. Even the beds and bedding in the officers' quarters and the men's barracks, were cut and torn into splinters and shreds. Had it not been for the bomb proof shelter, the loss of life would, no doubt, have been appalling. One shell entered the brick wall of Major Ripley's bedroom, ran down the wall and burst on the bureau immediately over the head of the bed. Our limited time prevented us from visiting the battery to the north of Fort Moultrie. We learn, however, that though many of the buildings around it had been struck several times, and fences, trees, &c., cut away, the battery sustained no injury.

It also appears that a large number of buildings were destroyed or greatly damaged. A list of seventeen fine country seats are named, and several other houses were struck with one or more balls, tearing off the weather boarding and shattering the roofs. The largest number of the houses, however, are untouched. Providentially no hot shot was thrown from Sumter, probably from the fact that the garrison had no fuel. "Many of those whose houses have been battered down deem it more fortunate than otherwise, and have determined to allow the buildings to remain, as far as possible, in the condition in which they were found after the battle, as a momento of the glorious 12th and 13th of April, 1861." And yet we are told that not a single person was either killed or wounded. We have got accustomed to believe a great deal, but this is a little too tough for our credulity.

### New Method of Separating Silver from Galena.

If sulphuret of silver is melted with chloride of lead, a decomposition takes place, and sulphuret of lead and chloride of silver is formed. If, therefore, galena, which consists of sulphuret of lead with some sulphuret of silver, is melted together with chloride of lead, the silver is extracted from the galena, and lead takes its place.

On this principle depends the new process, which is carried out as follows:—The galena is mixed with 1 per cent chloride of lead and 10 per cent common salt. If it contains much silver, a greater quantity of chloride of lead is added. The mixture is melted, and the chloride of silver formed by these means, together with the salt, floats on the top, and can easily be separated from the pure galena. The mixture of chloride of silver and common salt is afterward melted together with lime and charcoal, or treated in some other suitable manner, whereby the silver and the lead contained in the remaining chloride of lead is reduced. The mixture of silver and lead thus obtained is afterward separated in the ordinary manner.

Maryland.—In our last number, we referred to the singular position assumed by this State in reference to the passage of troops across her borders. There are evident signs that the conservative element of the State that quailed temporarily before a mob, is gradually asserting its sway. The Legislature has refused, by a two-thirds vote, to pass an act of secession.

The specific gravity of the metal aluminum is 2.5, or about one-fourth that of silver. In other words, a pound of aluminum is four times larger than the same weight in silver.

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## Correspondence

### The Opening of Steam Engine Valves.

MESSRS. EDITORS :—Enclosed you will find a table which we think sufficiently plain to explain itself. The same could have been extended, if necessary, to twice its present limits, having the data on hand carefully calculated by four of the most competent mathematicians and draughtsmen in this city, viz., Richard Hoskin, of the Niles Works ; J. L. Whetstone, formerly of the Niles Company's Locomotive Works ; J. C. Fink, formerly of the Harkness Company ; and Wm. M. Davis, mathematician and mathematical instrument maker, all men of good standing and of unquestionable ability.

These calculations were got up with great care, and were the work of time, labor and expense. All have been affirmed to here before the United States Circuit Court.

*A table showing the comparative or proportionate areas of openings made by valves of the various structures enumerated, the movement of each valve from the closed to the fully opened position being divided into eight equal parts, the first of which is taken as a unit of measure of the areas of openings.*

| No. | Description of Valves. | Movements of Valves. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1 | A parallel or rectangular aperture, opened by straight line valve | 1 | 2. | 3. | 4. | 5. | 6. | 7. | 8. |
| 2 | A triangular aperture, acute, obtuse or equilateral | 1 | 1.4 | 2.1 | 3.2 | 4.3 | 5.5 | 6.8 | 8.2 |
| 3 | A circle or true elliptical aperture | 1 | 2.5 | 4.4 | 6.6 | 9.1 | 11.7 | 14.4 | 17.1 |
| 4 | A circular aperture, opened by another circular aperture of same diameter | 1 | 1.4 | 2.1 | 3.2 | 4.3 | 5.5 | 6.8 | 8.2 |
| 5 | A valve of two semi-circular apertures, opened by valves with straight edges | 1 | 2.5 | 4.4 | 6.6 | 9.1 | 11.7 | 14.4 | 17.1 |
| 6 | The ordinary puppet valve with conical seat | 1 | 2.7 | 5.9 | 9.9 | 14.2 | 18.7 | 23.3 | 27.5 |
| 7 | A puppet valve having a concave seat, curved quadrant | | | | | | | | |
| 8 | A round butterfly throttle valve, closing at right angles to the pipe or seat | 1 | 3.1 | 6.7 | 11.7 | 17.6 | 24.9 | 32.7 | 41.7 |
| 9 | A butterfly throttle valve, closing at an angle of 27° | 1 | 3.2 | 6.7 | 11.7 | 17.6 | 24.9 | 32.7 | 41.7 |
| 10 | A butterfly throttle valve, closing at an angle of 45° | 1 | 3.2 | 7.1 | 12.3 | 18.5 | 26.1 | 33.7 | 42.5 |
| 11 | A butterfly throttle valve, as patented by Cope & Hodgson, May 10, 1859 | 1 | 2.1 | 3.3 | 3.6 | 5.2 | 7.1 | 9.1 | 11.1 |
| 12 | A butterfly throttle valve shown in J. H. Kramer's "Treatise on Mechanics," Vol. IV | 1 | 2.3 | 3.7 | 5.2 | 6.5 | 7.8 | 9. | 10.2 |
| 13 | A form of aperture as described in a patent by Junius Judson, Nov. 5, 1850, marked B as in present | 1 | 7.2 | 13.9 | 29.9 | 30.1 | 39.6 | 49. | 59. |
| 14 | A form of aperture as described in a patent by Junius Judson, Nov. 5, 1850, marked C | 1 | 3.7 | 9.7 | 18.7 | 30.7 | 44.8 | 61.2 | 78.5 |
| 15 | A valve used by Wm. J. James, at No. 140 Eldridge-street, New York | 1 | 2.7 | 5.6 | 8.9 | 12.3 | 16.3 | 20.5 | 24.8 |
| 16 | A form of aperture used by Crampton, in France | 1 | 4. | 9. | 16. | 25. | 36. | 49. | 64. |
| | | 1 | 4. | 9. | 16. | 24.5 | 33.5 | 42.5 | 51.5 |

Believing such a table to be new, or not found in a condensed form in any printed work, we thought you might draw from it without prejudice to any person, as it contains some valuable information for practical mechanics. In order to make the table more brief and comprehensive, we have omitted fractions, where it could be done without changing the result, believing it to be sufficiently accurate for all practical purposes. In the form of aperture selected from Judson's patent, we have selected that making the *greatest* as well as the *least* amount of graduation or increase.

Mr. R. G. Evenson, of No. 42 Bank-street, New York, got up a form of butterfly throttle valve that made a greater percentage of increase than any of this type of valve enumerated in the table.

Josiah Blackstone Greely, of Warren county, Ohio, combined a toggle joint movement to a butterfly throttle valve closing at an angle of 27°, thereby increasing its graduating tendency about sixfold, or in a scale as compared with the table from 1 to 80. The two cases just cited occured in 1846-'47.

All the valves, &c., enumerated above (to be found in the accompanying table) have been used in connection with a governor for regulating the speed of steam engines, and all but one prior to the year 1850.

NATHAN COPE,
On behalf of the Mechanics of Cincinnati.
Cincinnati, Ohio, April 15, 1861.

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SPAIN had ordered two large iron-cased ships in France.

### Improved Apparatus for Currying Thin Leather, Such as Kid Skins, Goat Skins, &c.

[From the Würtemberg Gewerbeblatt.]

The ordinary manner of currying leather consists in stretching the skin on a smooth, firm and perfectly level surface, generally a polished marble plate, and working down any uneven, rough and projecting portion of the same by means of a knife which is held nearly flat and carried over the rough surface of the skin with a peculiar curvilinear sweep.

It is obvious that this labor requires much practice, great manual dexterity, and continuous attention on the part of the workman ; it frequently happens that even the best workman makes a slip with his knife, whereby the skin is damaged, and, if not rendered entirely useless, is materially deteriorated in its value.

This circumstance, combined with the frequent complaints of the French manufacturers of kid gloves, in regard to the continually-increasing want of good workmen and the continuous demands for higher wages, has induced M. Alcan, Professor at the Conservatoire des Arts et Métiers in Paris, France, to devise an apparatus intended to carry out the operation of currying leather by means of machinery. It so happened that, simultaneously with M. Alcan, another gentleman, M. Chouillon, a practical currier of Paris, worked out the same idea, and both parties applied for Letters Patent in France at the same time ; and they afterward settled the difficulty by combining their interests.

The machine used by Messrs. Alcan & Chouillon consists simply in a stone cylinder, tapering at both ends, and secured to a rotary shaft. The shaft has its bearings in two standards which are firmly bolted down to the floor, and to which a board is attached, similar to a turning lathe.

The workman places the skin, with the flesh side down, on the cylinder, and retains the same by clamping the end firmly between his breast and the board. After the skin has been spread over the surface of the stone with the left hand, he presses with his hand on those portions of the same which are to be worked down, and the stone cylinder grinds off more or less, according to the greater or smaller pressure exerted by the hand.

In order to obtain cylinders of a uniform and homogeneous mass, and of varying coarseness, they are made of a composition consisting of kaolin, feldspar, quartz, pounded glass and pumicestone, with a small quantity of oxyd of iron, and after having been formed, they are hardened and dried in ordinary potter's kilns.

By this method of currying leather, the danger of spoiling or damaging the skins is completely obviated, and a girl with two weeks' practice is enabled to turn out more and better work than the best workman with the ordinary currying knife.

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AMMONIACAL POMATUM FOR PROMOTING THE GROWTH OF HAIR.—This pomatum applied to the scalp acts as a stimulant to the roots of the hair, and as a nourisher to the hair itself by stimulating the capillary vessels. In the immediate neighborhood of hair-bulb the blood-particles are more numerous and active. The ammonia, containing as it does nitrogen, one of the principal constituents of hair, horn, and nail, affords one of its direct elements of formation, and hence its value as a nourisher. It is utterly impossible for the animal economy to create hair out of any oil, because oil is destitute of nitrogen, but if grease be combined with ammonia, which yields nitrogen, then great benefit will be derived from the pomade so made. All pomades and oils that are used for the hair only act as a polish, but afford no nourishment. The following is a simple form for making the ammoniacal pomatum :—Take almond oil, a quarter of a pound ; white wax, half an ounce ; clarified lard, three ounces ; liquid ammonia, a quarter fluid ounce ; otto lavender and cloves, of each one drachm. Place the oil, wax, and lard into a jar, which set into boiling water ; when the wax is melted allow the grease to cool till nearly ready to set, then stir in the ammonia and the perfume, and put into small jars for use. Never use a hard brush, nor comb the hair too much ; apply the pomade at night only.—*Septimus Piesse.*

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A writer in the London *Times* states that 80,000 tuns of coal are raised in Great Britain annually.

### The Armory at Springfield.

Springfield is situated on a pleasant elevation within the Massachusetts lines, on the banks of the Connecticut river. The buildings at the Armory occupy the sides and part of the area of a large square, and the shops for forging are situated on a stream that falls into the river. The power to drive the machinery is obtained from water wheels. Smooth-bored muskets were exclusively made there until within a few years, when modern tactics required the consignment of old "Brown Bess" to oblivion. The term "Brown Bess" is not applicable to American muskets, the barrels of which are still polished and burnished in the old-fashioned style, while the English rifle-musket has its barrel browned, thereby saving an immense labor to the soldier. All small fire-arms should have their barrels browned like fowling pieces. About 35,000 *rifled* fire-arms have been made at Springfield altogether.

The barrel is the principal part of a rifle. It is made out of a skelp of the best quality of iron, rolled to the proper length and thickness, then welded over a swedge core so as to form a tube. This is now turned smoothly on the outside in a lathe, and also truly in the inside, by means of a long cutter, and rifled.

Each barrel must be perfectly straight, or it is of no use for accurate shooting. A very skillful mechanic, having an eye which can detect the slightest fault when he looks through the barrels, is employed to straighten them with a hammer and lever upon an anvil, and with a guide line. Quite a number of barrels are proved at once, when they are finished, to test their strength. Larger charges are used for this purpose than are ever expected to be put into them while in service. If the least flaw is detected after proving, the barrel is condemned.

The stocks are turned by Blanchard's machines, and the springs, &c., are all made alike by machinery. After a battle, a number of good rifles can be made up on the field, from broken ones, by the help of a simple screw driver, by combining the uninjured parts together. This system was first adopted in America, but it has been introduced into other countries. The gunmakers of Sheffied (England) now use American machines in their establishments, and it is said an agent of our government is now abroad with instructions to purchase and ship 500,000 stands of small arms immediately. Fifty thousand are expected within two weeks.

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TREASON IN THE CONFEDERATE STATES.—The Mobile *Tribune* says:—"Treason is the highest crime which can be committed ; it strikes at the root of the public welfare, and is, therefore deserving a greater punishment than that which only does harm to an individual or a limited number of individuals." In the Confederate States it is treason and death to disown a government that has no place in the history of nations ; but it is all right to undertake the overthrow of the liberties of 30,000,000 of people. Consistency, thou art a jewel.

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IT is a significant fact that, at the great war meeting in New York—the most imposing demonstration ever witnessed on this continent—the speakers said nothing about any efforts to abolish slavery. The government has no such intention, and would to-day send troops to suppress servile insurrection if called upon. So far as we know, the animating cause of the present sentiment of the North is to uphold an imperiled government.

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AN alloy compound of 10 per cent aluminum, and 90 per cent copper, resembles gold in color, and takes a polish equal to steel. In these proportions, this alloy is said to be a chemical, not a mere mechanical compound, like most of the brasses and bronzes. This alloy is now used with success for the bearing boxes of some French locomotives.

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OXYD OF CHROMIUM.—Our excellent cotemporary, the London *Chemist*, should have given the SCIENTIFIC AMERICAN, and not the *Mining Chronicle*, credit for the article on the above subject in its late issue. The information given is very useful, and originated entirely with us.

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A cubic yard of coal weighs about one tun.

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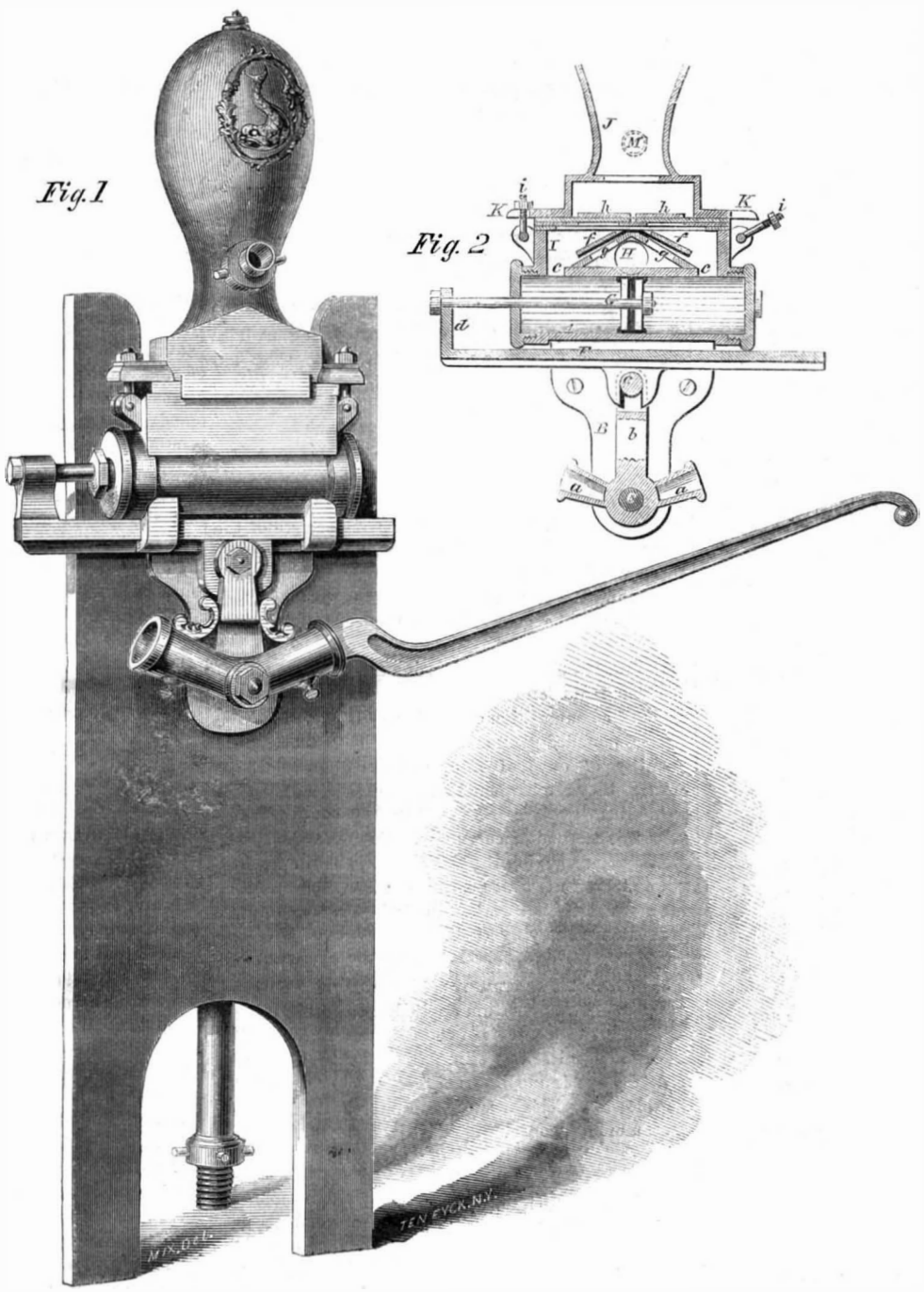
### Improvement in Pumps.

We invite especial attention to the pump here illustrated. It is the invention of Thomas Hansbrow, who is the principal mechanical director in the State Agricultural and Mechanical Society of California, and the invention consists in rational and ingenious devices of a practical mechanic to overcome practical difficulties experienced in the working of pumps. The hydraulic operations of California are of wonderful extent and variety, and the rapidity of their development is unparalleled in the history of the world, giving large experience and stimulating the inventive faculty of those engaged in them.

The novel features of this pump will be readily seen from the following description of its construction: The pump cylinder, A, Fig. 2, is secured by means of a plate or car, B, to a suitable board or standard. The plate, B, forms the bearing for the rock-shaft, C, which bears the cross-shaped piece D. This piece forms two sockets, *a a*, for the hand lever, E, and an arm, *b*, which connects by means of a pivot, C, with the sliding plate, F. This plate connects by means of an angular limb or standard, *d*, with the piston, G, so that by imparting an oscillating motion to the rock-shaft, C, a reciprocating motion of the piston is produced. The water enters through the suction-pipe, H, into the valve chest, I, which communicates with the interior of the cylinder through channels, *c*. The receiving valves, *f*, close down on the inclined seats, *g*, so that a small pressure is sufficient to raise them, and the water passes out through the discharge valves, *h*, which close the apertures leading from the valve chest to the air vessel, J. The air vessel is secured to the top of the air-chest by means of the swinging bolts, KK, which are pivoted at their lower ends and swung into slots in the ears of the air vessel, as shown. Thus, by turning down these bolts the air vessel is released and may then be easily removed.

The water rises in the air vessel, and is discharged through the spout, M, Fig. 1. By having the inclined valves arranged above the cylinder, any sand or other solid substances that may be drawn in by the pump, are prevented from lodging on the inclined valves, or their seats, and obstructing the operation of the pump. The valves are also by this arrangement kept tight, so that the charge of water necessary to operate the pump cannot escape. By the sliding plate arrangement to work the piston, the latter is not only operated but kept in a straight line with the axis of the cylinder.

The patent for this novel arrangement was granted, through the Scientific American Patent Agency, Feb. 5, 1861, and further information in relation to it may be obtained by addressing the inventor, at Sacramento, Cal.




HANDSBROW'S IMPROVED PUMP.

THE steamship *Great Eastern* will be open for exhibition to the public for seven days, during her stay here. The exhibition will begin about the 21st inst.

### The Farmers and the War.

This country would be able to support a very large number of fighting men through an indefinite period of time if the peaceful industry of the community was directed to this end. It would simply be necessary to divert the labors of those who are now engaged in making superfluous luxuries to the production of food and clothing. This diversion of labor will be gradually effected by a decline in the price of luxuries and an advance in those of the necessaries of life. This already begins to be felt; while works of art, books, jewelry, &c., are of very slow sale, the coarser styles of woolen cloths and satinets have advanced some 30 per cent in price in such colors as are adapted for military purposes. If the community is intelligent, they will anticipate this change in the market demand for articles, and will, by a prudent forecast, save us from a scarcity of products absolutely essential to existence. This applies with especial force to farmers. Let them sow their seed with perfect confidence that there will be a certain demand for their crops, which will bring better prices than in preceding years. Above all things, let us not have the horrors of famine added to the trials of war.

PATENTS GRANTED TO SOUTHERN MEN. — The papers are all mentioning the granting of a patent by the United States government to a citizen of South Carolina as something remarkable. A glance at the official list of patents, published in our paper, will show that numbers of them are granted every week to citizens of the seceded States.

### Shipwreck from a Small Crew.

The American ship *Witchcraft*, bound from the Chincha Islands to Hampton Roads, with guano, was recently wrecked near Cape Hatteras. At 4 P. M., when all hands were on deck, the ship struck while the crew were hauling up the mainsail. The Boston *Commercial Bulletin* states that this was caused by having too few hands to work the vessel, and asserts that an English ship would have stayed without hauling the mainsail up.

The *Witchcraft* was heavily laden, and, as there was a heavy swell, her masts were forced through her bottom; she filled, heeled off shore, and in half an hour was a total wreck. The masts fell on deck and killed several of the crew; the boats were stove, and nothing was left to save life by but the debris of the wreck.

There were 40 persons on board, only 17 of whom reached shore, which was quite near. Had there been life preservers on board, all could have been saved but those who lost their lives by the fall of the rigging. All houses on the decks of vessels should be so constructed as to float off and form life preserving rafts.

### Steel Cannon.

The London *Engineer* states that two new guns have just been completed for the British government by the Mersey Steel Company. They are made of puddled steel, consolidated under the huge steam hammer. Their length is 9½ feet, weight 4 tuns, 3 cwt. Their bore is only 6½ inches, and yet they are intended for 100 lbs. shot, of the conical cylindrical form.

Puddled steel appears to us to be the most suitable of metals for making strong cannon. It is capable of being run almost like cast iron; then it may be hammered to consolidate its particles, thus imparting to it the duplicate quality of cast and wrought steel, so as to resist both tensile and crushing force in a superior manner.

ABUNDANCE OF SILVER.— Two correspondents writing to the London *Times*, state that the recent discovery of oxyd of silver in a natural state, a thing which, until recently, was believed not to exist, will produce a yield of silver absolutely enormous in relation to that which has hitherto been obtained from the ordinary metallic silver deposits. In a tun of ore, in its natural state, where the normal yield would be thirteen ounces, the new discovery will produce an average yield of 113 ounces, the 100 ounces being produced from what has hitherto been regarded as useless. The importance to our mines, where silver is often found near to copper and other metals, will be very great; and in some cases, where the deposit is great and un mixed with other metals, the returns will be almost fabulous, where the cost of working will be absolutely trifling.

**No solder has yet been discovered** for joining the edges of aluminum plates. The invention of a solder for this purpose is a desirable object.

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NEW YORK, SATURDAY, MAY 18, 1861.

## WORKING STEAM EXPANSIVELY.

In page 281, current volume of the SCIENTIFIC AMERICAN, we presented a condensed review of the steam experiments conducted at Erie, Pa., as obtained from the recently published report of the Board of Naval Engineers. These experiments, according to our view of the question, have proven that there is no saving in expansive steam of low pressure—that which is commonly carried on our low pressure steamboats. It is exceedingly important to know this; these experiments are therefore very valuable to the engineering world. We will now give some information on the other side of the question.

The London *Engineer*, in a recent article on this topic, asserts, that while non-expansive engines require 30 lbs. of water per horse power in the hour, there are expansive locomotives and Cornish engines which only require from 15 to 25 lbs. This shows that a saving of fifty per cent may be effected in an engine working steam expansively, when it is properly constructed. We have also seen several statements published by our foreign cotemporaries, respecting a peculiar economical compound class of engines called the "Rowan Patent," which have lately been applied to several British steamers. These have a small high pressure cylinder connected with a large low pressure one; the steam is admitted into the former at 100 lbs. pressure, and is exhausted into the large cylinder, where it is expanded down under 11 lbs., before it is exhausted into the condenser. An American engineer, lately returned from Europe, has assured us that the saving of fuel in these engines is perfectly astonishing; they run with less than two pounds of coal per horse power in the hour, whereas six and seven pounds is the common consumption in other marine engines. These facts are all in favor of working steam expansively.

In a late number of the *Journal of the Franklin Institute*, Robert J. Thurston, engineer, gives his experience, and presents several indicator diagrams in favor of expansion. He states that the most economical engine carrying full pressure, tested by him, is one built at Wilmington, Del., which runs night and day in a warm engine room; its consumption of coal is four pounds per horse-power per hour. On the other hand, he states that an expansive working engine, built at Providence, R. I., only consumes two and a quarter pounds of coal per horse-power. The higher the pressure of steam carried, and the greater the range of expansion, the greater has been the economy of fuel in this engine. These facts are also in favor of expansive working, when the engine is properly constructed for the purpose.

According to the science of steam, as it is understood by intelligent men, it is very unsatisfactory to assert that a great loss is caused by the condensation of steam in cylinders when it is used expansively. The loss of energy in steam is just in proportion to the work which it performs, and if it is allowed to be exhausted at full stroke and at a high pressure, there is a great deal of work thrown away into the atmosphere.

A correspondent—Mason Hearsey—writing to us from Ionia, Mich., on this topic, states that he has tried a great many experiments with his engine, with different pressures of steam, and cutting off at different points of the stroke. When running with steam at 25 lbs. pressure, no advantage was obtained by cutting off; but when running from 40 lbs. pressure up to 70 lbs., he found a great benefit in working the steam expansively. His engine is quite small, and perhaps the advantage which he obtained in cutting off with high pressure, may have been due to a more free exhaust, and a lower *final* than *initial* pressure of the steam. He states that with a short quick stroke, and steam from 30 lbs. upwards, quite a saving is effected in cutting off at half stroke, according to his practice.

## WAR, BUSINESS, AND WOMEN.

During the Revolution, Benjamin Franklin rendered as important and valuable services to the country as any other man, with the possible exception of Washington. At the crisis of the war, Washington wrote to Franklin that unless he could persuade the French government to make an advance of money, it was difficult to see how the army could be kept together; the money came and the war was soon ended. But, in the midst of these important public services, Franklin managed to keep his own property constantly increasing. Washington, too, amidst all the cares of the camp, kept a prudent watch over his private affairs; and there were many other men whose wealth steadily accumulated during that long and wasting war. The thousands of millions of dollars' worth of property which was destroyed by the British government in the twenty years' contest with Bonaparte, was contributed from the profits of business men, profits made mostly during the war and invested in the public funds.

Still, there is no doubt that, as a general rule, business is less prosperous in times of war than in those of peace. If great numbers of men are taken from the labor of producing wealth and set to the work of destroying it, the production of wealth must be diminished; and unless there is a corresponding diminution in the consumption, the accumulation must be at least checked, if not stopped. The plain way, therefore, for a people to carry on a war without diminishing their wealth, is by a general practice of individual economy. One of the most important elements in the military resources of this country is the elasticity in the habits of our people. We can adapt ourselves to circumstances. An American can make himself at home in the drawing rooms of dukes and princes, or he can sleep on straw and live on soldiers' rations.

There are thousands of ladies in the country who are anxious to know what they can do to aid the government in the great struggle which is now before us. They can do quite as much as the men. "In war," said Louis XIV., "it is the last guinea that wins." There are to be large amounts of government stocks offered in the market, and these can be bought only with the savings from private incomes. Let the growing fashion of wearing diamonds be given up. Leave to servant girls the display of showy jewelry, which they can buy at "a dollar for your choice," and let the patriotic purpose prevail of practising economy in every possible form, in order to save money to invest in public stocks. In the present state of chemical science, there is a reasonable prospect of the discovery, at any time, of the art of crystallizing carbon; if this discovery should be made, diamonds would immediately become as worthless as quartz pebbles; but United States bonds are as solid and safe an investment as it is possible to find—in the uncertainty of all human affairs.

## AMERICAN MACHINES AND IMPLEMENTS FOR ENGLAND.

A very interesting paper upon this subject was read before the London Society of Arts on the 3d of last month, by C. W. Eddy, Esq., who has made a tour of the United States, and paid a great deal of attention to our labor-saving machines. He stated that the traveler could not fail to be struck with astonishment at the vast amount of labor which had been achieved—of forests cleared, lands reclaimed, canals and railroads constructed, and cities built, by a scattered population in the brief period of time that has elapsed since the country was first commenced to be peopled. About 5,000 miles of canals have been built, 30,000 miles of railway; and there are half a dozen cities, at least, which rival in magnificence a like number of the capitals of Europe. The merchant navy of America is not inferior to that of England; and the manufactures, commerce and natural products of the United States are vast, and, in some respects, unequaled. These results have been accomplished in a climate having great relaxing heats in summer, and winters of greatseverity. The indomitable energy of the people, aided by inventive faculties of a high order, did all this.

We will enumerate several American tools, machines and systems which Mr. Eddy stated should be introduced into England.

They consist of grain cradles, horse-powers, chopping axes, grain elevators, fence augers, spring rakes, unloading hay forks, road scrapers, small grinding mills, light carriages, stone-breaking machines, steam ferry boats with elevating landings, and floating docks.

Hitherto, the prejudice in England against foreign-made machines has been so strong as to prevent their introduction; but this bigotry is thawing away before the genial sun of increasing intelligence.

As most of our agricultural implements may be exported to England without paying duties, our makers should direct their attention to this opening for their articles.

At the close of reading Mr. Eddy's paper, Mr. Anderson, of the Woolwich Government Factory, bore testimony to the extreme ingenuity of the Americans—the skill with which they produced by machinery such articles as a great demand enabled to be manufactured by constant repetition. He considered the organization of workshops—the relations between the masters, the foremen and the workmen—more satisfactory than in England; but said that he had found no factories where the tools for manufacturing were to be compared to those in use in such factories as Maudeslay's and Field's, or Penn's.

Mr. Cassell mentioned several examples of ingenious labor-saving machines for domestic use which he had come across during his recent residence in the United States; but he showed that Mr. Eddy's idea as to the superior cheapness of certain American manufactures was erroneous. For instance, a pair of shoes which could be purchased for 11s. or 12s. in London, cost 20s. in New York. Steel and iron goods were protected by a duty of 25 per cent, which had recently been raised to nearly 50 per cent.

## KEEP THE MACHINERY RUNNING.

One of our acquaintances, who is a man of great wealth, and one of the most extensive cotton manufacturers in the country, is so imbued with the patriotic spirit of the times, that he is willing to enter the ranks as a volunteer, and march into the South with the army, leaving his large business to take care of itself as it may. But he is told by the Governor of his State that he can serve his country far more effectually by staying at home, and attending diligently to his mills. There is no doubt about the wisdom of this advice. We are entering upon a great struggle, which will destroy and waste property with terrible rapidity; and the only way in which the nation can be saved from swift impoverishment and exhaustion is by a corresponding production of wealth. Let, then, the various engines and machinery, that so wonderfully multiply our power of producing wealth, be kept in unceasing operation. The proportion which the annual product of wealth in any community bears to the whole accumulated property is surprisingly large. For instance, the people of Massachusetts are worth $750 apiece in the average; and their average incomes, including the profits of the great merchants and manufacturers, is probably not less than one-quarter of this sum. The wealth of Ohio, if divided equally, would give $379 to each inhabitant; and the annual product can hardly be less than half of this amount. In all cases the consumption is very nearly equal to the production; and if the richest commnnity in the world should stop producing the means of subsistence, and fall back upon the accumulated property, they would come to poverty and starvation in a single season. The great waste which is now going on in war can be counterbalanced only by a corresponding vigor in production. It is the very worst time for us to lay aside our numerous steam engines and multiplied mechanism.

We do not advise the manufacture of any goods that are not wanted by the community; this is worse than letting the mills lie still; but it is plain that if any

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owner of a machine shop or manufactory can make any article which the community need, he can render no better service to his country than by keeping his works in steady operation.

## DETERMINING DISTANCES BY LIGHT, ANGLES, SOUND AND WALKING.

Soldiers should be able to determine the distance they have traveled in marching ; also the distance of a gun by the report of its discharge ; the distance of men and horses by common observation ; and also by the angles, using a pencil, or a common foot rule, for this purpose.

In determining the distance of space traveled over in marching, it is necessary that a straight line should be preserved, or allowances made for curves and deviations. The military pace is 2 feet 6 inches ; therefore, by keeping an account of the number of steps taken in a minute, we arrive at the space traveled in one hour, or in one day. Thus, 108 paces per minute, at 2 feet 6 inches each, are 3.07 miles per hour. This is a simple method ; although not perfectly accurate in measuring the space traveled over, it is yet worthy of recollection by soldiers and travelers.

In judging the distances of objects by common observation, it has been ascertained that the movements of men can be seen at a distance of 2,600 feet, but neither the head, arms, nor limbs are distinguishable at that distance. At 1,300 feet each head becomes clear to the vision. A horse can be clearly distinguished at a distance of 4,000 feet, and a horse and his rider, as a moving body, at 1¾ miles. There is such a difference in what is called "the strength of vision," that scarcely six persons can be found in one company whose powers of sight are uniform. By measuring known distances, however, and viewing the appearance of objects at such distances, we can acquire, by this practice, great proficiency in estimating distances.

In appreciating distances by sound, it is already known that sound travels at the rate of 1,090 feet per second, in dry air at the freezing point, and 1¼ foot less for every degree above 32° Fah.—making it 1,058 at 60°. When we see the flash of a cannon or musket, and note the exact time, by a stop watch, of the interval that occurs until we hear the report, by multiplying this, in seconds, by 1,058, when the air is at 60°, we will obtain a tolerably accurate answer respecting the distance of the cannon or musket. The direction of the wind and its velocity modify the result; still, with a little practice and close observation, such as are acquired in the camp, we can approximate very closely to perfect accuracy.

To measure the distance of objects by angles, using a pencil or common foot rule (which most soldiers should carry with them), for this purpose, the accompanying illustration will serve to explain the princi-

ple. Prepare a scale on a common pencil and mark it off into spaces which cover a man of 5 feet 9 inches in hight, standing at 50, 100, 200, 300, and 400 yards distance, and so on, up to 1,200 yards, or a mile. Two men can, in this way, make a scale of distances in a very short space of time, the one acting as the object of measurement, the other marking the pencil. And when the pencil is thus graduated with a scale, any number can be copied from it.

The instrument is used as follows:—When a man is seen at an unknown distance, hold out the pencil at arm's length, with the top of it in line with the eye and the head of the object, then place the thumb nail at the line on the pencil which runs direct to the feet. The space on the pencil which covers the object will indicate its distance from the observer.

A foot rule is a very convenient device for measuring distances in this manner. Thus, if a foot rule is held out at 2 feet from the eye, and one inch of it covers a man 5 feet 9 inches high, he must be 138 feet distant. The arm must be kept very steady while thus endeavoring to ascertain the distance of objects. The average hight of men is 5 feet 8 inches ; a man on horseback is about 9 feet high.

All riflemen and artillerists should make themselves familiar with all the simple modes and devices for determining the distances of familiar objects, such as men, horses, tents, houses, trees, &c. The ramrods of cannon are frequently graduated with a scale, in the manner described for the pencil.

### Device for Cleaning out Rifles, Muskets, &c.

The accompanying engraving represents a very simple device for cleaning out small fire-arms ; it was recently patented in England by Wm. Wilson, of London.

A flexible tube, *a*, of vulcanized india-rubber, is secured at one end to a sleeve, *b*, of brass, which fits on the nipple of the rifle or musket to be cleaned. Said sleeve is provided with a head on which the hammer

rests, and by these means the sleeve and the tube, *a*, are firmly retained on the nipple. A small piece of metal pipe, *c*, may be inserted into the opposite end of the india-rubber tube, to impart to the same the desired weight.

When it is desired to use this device, one end of the tube is secured to the nipple by means of the sleeve, *b*, and its other end is inserted into a vessel containing water. One end of the ramrod is now converted into a pump piston by wrapping around it a small quantity of oakum, and by moving this piston up and down in the barrel, the water from the vessel is alternately sucked in and forced out through the nipple, thereby cleaning the barrel rapidly.

### Infectious Opthalmia—A Fact for Hospital Physicians.

A fact throwing considerable light on the propagation of contagious miasma has recently been made by Dr. Eiselt, of Prague. In the Foundling Hospital at Repy, out of 250 children, between the ages of 6 and 10 years, 92 cases of blennorrhœa of the ocular conjunctiva occurred. This epidemic opthalmia fully convinced Dr. Eiselt that the contagion was transmitted by other means than by contact. The doctor ordered the nurses to carefully avoid touching the eyes of the afflicted children, and he was no less careful himself ; but notwithstanding every precaution, both the doctor and the nurses were attacked with the disease. Dr. Eiselt then thought of examining the atmosphere of one of the wards of the hospital containing many patients, by means of an aeroscope, and in the first portion of air that passed into the instrument, he distinctly recognized small pus cells, which certainly served as vehicles of contagion.

The great importance of this discovery should induce physicians to give it a thorough investigation, so as to provide proper measures for preventing infection by this disease. Opthalmia oftentimes becomes a terrible plague in military hospitals during active warfare, especially in warm, dry climates, where the soil is light and sandy. The best preventive, we think, of the virus of opthalmia being transmitted through the atmosphere of hospitals is a free circulation of pure air, as this involves the quick removal of infected air.

### India-Rubber Facing for Forts.

Messrs. Editors :—Please inform me, through the Scientific American, that if Fort Sumter had been covered on the outside with heavy sheets of india-rubber, say ten inches thick, could such covering protect the fort from the heavy shot and shell of the enemy? India-rubber will stop a locomotive at full speed, and might possibly stop a cannon ball.

If it is practicable, we can soon invent a very easy way to fasten it to forts or war vessels. Americans must invent an external covering for war vessels that will be lighter than iron ; we must have faster sailing vessels of war than the French iron-plated frigates, and be equally as well protected. No such word as "fail ;" we can do it if we try. Henry Fisher.

Alliance, Ohio, April 29, 1861.

[Experiments have been tried with india-rubber for covering vessels ; but it is impracticable, as it would require very great thickness to be effectual, and the material is very expensive.—Eds.

### Campaigning Axioms.

We copy the following excellent suggestions from the New York *Trtbune*:—

1. One well fed, well equipped, well appointed brigade is worth two that are ill provided.

2. In active service, three men die of undue exposure, bad food, and their own imprudences, where one is killed by shot or stab.

3. An easy, rational, nicely fitting uniform, with warm, substantial blanket, broad-soled boots or shoes and good woolen socks, will more conduce to efficiency in service than superiority in weapons.

4. The lightest possible head-covering, with a good look-out for ventilation, will add a tenth to the distance a regiment can march in a day, while insuring increased comfort.

5. A small cotton handkerchief, or half a yard of the commonest sheeting, moistened with water in the morning and again at noon, and worn between the hat and the head, will protect the soldier from the sun-stroke and greatly diminish the discomfort and fatigue of a hot day's march.

6. A flat bottle covered with woolen cloth, the cloth being moistened and the bottle filled with water in the morning, will keep reasonably cool throughout a long, hot day.

7. Of all villainous concoctions, the liquors sold by camp-followers are the most detestable and dangerous. They are more deadly than rifled cannon, and are sure to be taken just when they should not be. Every soldier who means to do his duty to his country should insist that all venders of these poisons be drummed out of camp.

8. A good cook to each company, who knows how to make salt meat juicy and tender, and to have it ready whenever and wherever it may be wanted, is equal to two doctors and four extra combatants.

9. Officers who love and care for their men while in repose never have to complain of their conduct when in action.

10. A soldier whose heart is in the cause he fights for is worth two who fight for their pay.

### A Pertinent Question from an Inventor.

Messrs. Munn & Co.—My model is ready, and I wish to know if it is of any use to try to do anything under the present state of things.

I had my doubts about getting anything done with dispatch now, under the rather peculiar state of affairs at the seat of government. Please inform me at your earliest convenience, and oblige yours, truly, T. H R.

In answering the above, we reply to other letters of similar purport which have been lately received at this office. The city of Washington is now safe from attack by secessionists, beyond any question, and at the Patent Office, business is being transacted as usual, and the papers are transmitted to Washington by mail as safely as ever. Applications are acted upon with even less delay than usual, as the Examiners have less cases and therefore not so much to do.

It is stated, on the authority of both English and French experimenters, that the injection of air into the veins of the human or animal system causes instant and painless death.

The Amount of Lead Required to Kill a Soldier.—At the meeting on Monday, April 29th, at the Cooper Institute, Dr. Church addressed the audience upon the mortality incident to war. Disease and exposure constituted, he said, the great causes of death among soldiers. There had been obtained careful statistics at the Crimea and other places, of the amount of metal employed, and the number of the killed and wounded. The result was that they had ascertained, with wonderful mathematical certainty, that 270 lbs. of lead were shot away to every man that was killed. Prevention against disease, was, therefore, what the soldier chiefly needed.

Affairs at Harper's Ferry.—We are at last in possession of official details concerning the condition of affairs at Harper's Ferry, after the destruction of the armory by Lieutenant Jones. It seems that the work was by no means an entire success. The fire did not touch one large depot which contained 8,000 stand of first-class arms, and the entire machinery of the armory is in as good order to-day as it ever was. The Department attach no blame to Lieutenant Jones, thinking that he did the best he could under the circumstances.

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## ROMANCE OF THE STEAM ENGINE.

ARTICLE XXIII.

STEAM NAVIGATION.

We have already traced the rise and progress of the steam engine from the toy of Hero to the splendidly finished engine of the present day. We have also described its application to working mines, and operating machines in all branches of the manufacturing arts, and also to locomotion on railroads. With this article we will close the series for the present.

The application of steam to move vessels, for navigating rivers, lakes, and seas, has been the means of bringing distant nations into more rapid and familiar intercourse, and it has extended the boundaries and improved the facilities of commerce.

We do not consider the successful application of steam power to navigation such a great invention as so many writers have held it up to be. The fact is, the power of steam was proposed for propelling vessels nearly a century before it was finally accomplished, and many experiments were also made, and it was not until the steam engine was perfected that success attended such efforts. The improver of the engine, therefore, deserves the most credit for this system of navigation.

In 1726 a Dr. John Allen, of London, published a pamphlet in which he proposed to propel a boat by a jet of steam flowing out at its stern. In 1737 Jonathan Hulls, of London, patented a mode of propelling boats by stern wheels, using the power of steam in an engine to drive the wheels. In 1782 the Marquis of Joffrie experimented with a boat 140 feet long, on the river Loire, at Lyons, France. He employed paddles revolving on an endless band, driven by a rude engine. We think this was the first steamboat experimented with. In 1784 James Rumsey, of Virginia, and John Fitch, of Connecticut, experimented with steam in moving boats. The former applied the power of steam to force a jet of water out at the stern of a vessel; the latter employed a series of vertical paddles alongside his boat, giving them a motion like that of rowing by hand. It is also stated that Fitch tried the paddle wheel and screw in some of his experiments. About the very same period, Patrick Miller, of Scotland, also made several experiments with stern wheels for a propeller, using a small steam engine to drive it. Stevens and Evans also made experiments with steamboats, between 1800 and 1804, but they ended with experimenting. It was Robert Fulton who successfully established steam navigation, in 1807. His boat, called the *Clermont*, was built in New York, under his directions; the funds for this purpose were furnished by his friend and patron, Chancellor Livingston, and the engine was built by James Watt, at Soho, England, and sent out by a sailing vessel.

Robert Fulton was born in Lancaster county, Pa., in 1765. He received a tolerable common-school education, and having exhibited a good taste for drawing, he devoted himself to painting portraits and landscapes as a profession. The spirit of mechanical invention, however, was upon him, and he gave early indications of genius in designing and constructing machines. In search of health he visited England when he was 21 years of age, and was kindly received by West—the great American painter—who was an acquaintance of the family. He made England his home for several years, and became a civil engineer. While engaged in this profession, his attention was directed to steam navigation for canals, and this subject took such complete possession of his mind that it almost excluded everything which did not bear upon it. He made neat drawings of steamboats, and endeavored to induce several men of capital to assist him in building a boat; he even solicited Napoleon to furnish him with means to construct one for the French navy. This great conqueror, although he was a master in the art of war, had very low notions of new inventions, so he considered Fulton a sort of fanatic and dismissed him. At length our inventor found a far-sighted, liberal friend in his countryman, Mr. Livingston, the American minister at Paris. When Fulton explained his designs to him, he at once appreciated their merits, sent the inventor to order an engine from Bolton & Watt, then dispatched him to New York, to build a suitable boat, which was named the *Clermont*. It was 160 tons burden; the engine had a cylinder 24 inches in diameter and a stroke of 4 feet. This boat started on her first voyage to Albany, N. Y., on the 10th of September, 1807, amid the cheers of wondering spectators. She made the trip of 150 miles in 30 hours, and from that day navigation by steam power has never ceased—this trip of the *Clermont* established steam navigation forever.

Robert Fulton was tall and slender in form, his face was handsome, and his manners gentle and kind. He died in New York on the 24th of February, 1815, from a severe cold which he contracted by exposure in crossing the Hudson river a short time previously, when it was full of ice, which detained him on it for several hours. He lies buried in Trinity churchyard, in the vault of his wife's relations—the Livingston family.

### Ozone in the Atmosphere.

The following very interesting extracts on this subject are taken from a lecture by Professor E. Frankland, F. R. S., lately delivered before the Royal Society, and published in the *Chemical News:*

Hydrogen is capable of uniting with one equivalent of oxygen, forming water; with two equivalents of oxygen to form binoxyd of hydrogen; and with three equivalents to form "ozone," or, at all events, to form teroxyd of hydrogen, the existence of which is theoretically indicated, if ozone be not this very compound. What is this ozone? Some chemists suppose it not to contain hydrogen; others think it does contain hydrogen; and a series of analyses certainly did seem to prove that hydrogen, in the proportion I have stated, was a constituent of ozone. Now, ozone is produced in two or three different ways. One of the most peculiar is by means of the electrical machine. There is a peculiar odor in the neighborhood of an electrical machine when worked, and that odor is usually supposed to be due to ozone. It is caused by electric sparks passing through the air. We can collect this ozone in a variety of ways; but before doing this, I must refer you to the liquid contained in this glass vessel, which furnishes a very delicate test for the presence of ozone, and of other matters, too, as we shall presently see. It consists of a solution of iodide of potassium and starch. Ozone, containing as it does, three equivalents of oxygen, readily gives up oxygen, and it is capable, in this way, of oxydizing the iodide of potassium and converting the potassium into potash. The iodine thus liberated forms an intense blue solution with the starch. Here I have a Ruhmkorff's coil, which will give us a series of sparks. You see by the working of this air pump the so-called ozonized air passes through the liquid which becomes blue. You see we have now got a very decided blue coloration here. That is one mode by which ozone is produced; but we shall see that the blue color is not entirely due to the presence of ozone. Now, another mode for the production of ozone is by placing moist phosphorus in a close air jar. Here is some filter paper which has been imbued with the solution of iodide of potassium and starch, and which will become blue when it is plunged into this vessel containing ozone produced by this process. This constitutes what is generally known as the usual test for ozone in the atmosphere. Then we have another mode of producing ozone, and that is by electrolysis. When water is mixed with some highly oxydizing substance, such as chromic acid, we have this ozone produced when the water is decomposed by the current of electricity. It was from this source that ozone was produced for analysis, and it was from this that the formula I have here used was formed—namely, $HO_3$, three equivalents of oxygen and one of hydrogen.

Ozone, as I have said, is supposed to be present in the air, and many very careful observers are at the present time making observations upon the relative quantities of ozone present in the air. Papers of this kind [exhibiting ozone papers] are exposed to the atmosphere for certain fixed and definite lengths of time, the amount of blueness which they manifest in that time is carefully noted, and the intensity of this blue color is supposed to represent the comparative quantity of ozone present in the air. Now, it is greatly to be regretted th t such an amount of labor should be expended upon a matter which is utterly and entirely valueless, because this so-called "test" for ozone is really only a test for a great number of things which may—nay, do—exist in the air, and from which ozone may be really absent. We may say that there is not, up to the present time, a single experiment which demonstrates that ozone is present in the atmosphere; and certainly these tests, so far from proving its existence, do not even infallibly demonstrate the presence of an oxydizing influence in the air. It is quite possible that this blueing of the paper may be produced in a condition of the air very different from that in which ozone is present. Ozone being a highly oxydizing substance, is supposed to decompose organic impurities in the air, and therefore the air which contains the largest quantity of this ozone is supposed to be the most wholesome. You have only to have present, in the air, some acid gas—you have only to go into the neighborhood of some chemical works, for instance, where hydrochloric acid gas is evolved—and you will there have plenty of these manifestations of the presence of ozone. Here we have some solution of iodide of potassium and starch and I acidify it with acetic acid. You see we have abundance of acetic acid indicated, but it is said that ozone is never present in this part of London. The liquid has become of a dark blue color. The reason is, that the iodide of potassium which is contained in this liquid, and in all these test papers, is decomposed by acids, and hydriodic acid, a compound of iodine and hydrogen, is immediately formed. It is only necessary to bring this hydriodic acid in contact with free oxygen, when the hydrogen is oxydized and the iodine is liberated; so you see this so-called "test" for iodine is perfectly unreliable.

### Patents in the Seceding States.

During the past three months we have had a number of applications from persons in high positions residing in the Southern States, soliciting our cooperation in the establishment of a patent system in the seceded States. Our reply has been: "When our government and other nations acknowledge your Confederacy as one of the national powers, we shall be ready to establish a branch of our business at your capital; but until then we must decline any recognition of your power to grant patents, or your right to disregard the claims of patentees whose rights are secured to them under the federal laws, whether the inventor resides North or South, or in a foreign land."

We have received circulars from one or two Southern cities, soliciting inventors to protect their inventions under the provision which the Southern Confederacy enacted on the 4th of March, and which was published on page 202, present volume of the SCIENTIFIC AMERICAN; and we presume Northern patentees have pretty generally received such circulars. In fact, we know many have, for a number have asked our advice as to the propriety of securing their inventions in the South.

To those who have written, we have told to wait until we advised them further; and this answer will apply to thousands more who have not yet put the inquiry, but who are not less desirous to know our opinion.

### Brown's Breech-Loading Cannon.

We learn from the Providence *Journal* that our old friend, Captain Brown, of Warren, R. I., has constructed a working model of his breech-loading cannon, which was illustrated on page 240, Vol. III., of the SCIENTIFIC AMERICAN, which he has introduced to the attention of the authorities of Rhode Island. The *Journal* says:—

This model works very satisfactory, and the patentee is well convinced that the larger the caliber of the piece, the more satisfactory it will work; and he is desirous of immediately making one that will throw a six or eight-pound ball. The claims made for this new piece are, the easy manner in which it is worked and the rapidity of its discharges, the model showing that it can be safely discharged over twenty times each minute.

### The Patent Office Safe—A Good Time to Apply for Patents.

There is no longer the least apprehension for the safety of the Patent Office, and business is transacted in the various departments with nearly its usual alacrity. The number of applications for patents is not so great, in times like these, as usual, while the clerical force of the Patent Office is not diminished. This gives the Examiners more time to investigate into the novelty of inventions brought before them, and at the same time to keep their work well up.

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## LETTER FROM OUR WASHINGTON HOUSE.

WASHINGTON, April 30, 1861,

MESSRS. EDITORS :—The mail now runs daily, *via* Annapolis, to the North, so that inventors may freely communicate with the Patent Office Department. Governor Sprague's regiment, of 1,200 men, are now temporarily quartered in the Patent Office. The three Examiners' rooms, next adjoining the vestibule, are occupied as hospitals and surgeries, the examiners being distributed around among other rooms. The officers occupy Chief Clerk Shugert's spacious office, the small room between that and the Commissioner's apartment, and also the Messenger's room, on the other side of the Commissioner's. The Chief Clerk, for the time being, has moved into the room opposite the head of the eastern stairway.

The soldiers occupy the three great model halls, and have come to the conclusion that to "dream that they dwell in marble halls" is far more agreeable than the reality, especially when it involves sleeping on that cold and hard material, without so much as a plank intervening. However, they are now fixing up bunks between the model cases, which, though a great convenience to them, will be otherwise to us. In the central model hall they have moved all the cabinets over to one side, setting them so close together that we can scarcely get between them, and the south side of the hall will be occupied with dining tables. A number of the recording rooms in the basement have been cleared of their occupants, and are being filled with stores for the troops.

The Examiners, though they are at work, are so much taken up with the excitement of the period and the bustle about the office that they cannot give the usual attention to business. I called on the Commissioner to-day to ascertain authoratively how long this state of things may be expected to last. He says he consented to accommodate the troops in the Office for a little while, but that it would not last long, and, in the meantime, they should carry on the business of the Office with as little obstruction as possible.

I told him that we found all the officials as accommodating as could be expected, with 1,200 soldiers in the way. In fact, the only inconvenience we find is in being often called to give the countersign before we are allowed to pass through places much more familiar to us than to those who guard them ; and if we want to examine the model of a plow, the first operation is to get our protectors to move a couple of dozen muskets which are leaning against the door of the cabinet.

For a large part of the time yesterday and to-day wagons were backed up to the sidewalk in front of the Patent Office about as closely as they could stand, from Seventh-street to Ninth-street, and laborers were occupied all night in taking the army stores into the Office.

Among other conveniences brought from home by the Rhode Islanders are three washerwomen, two portable forges, several four-horse baggage wagons, a full supply of horses for these and for the officers, and provender for the animals.

The New York Seventh regiment are in the south wing of the Capitol, and the Twenty-fifth (Albany) are, I think, somewhere in the same building. The Twelfth are at the Assembly Rooms ; the Seventy-first at the Navy Yard. The Massachusetts Sixth are in the north wing of the Capitol, and the Pennsylvanians in the great Inauguration Ball Room back of the City Hall. There are 1,300 troops of some kind in the Arsenal, and I do not know how many in the Treasury. District of Columbia militia occupy the Post Office. Nearly all the public buildings and halls are filled with soldiers, and they do no little damage in defacing the buildings. In the Capitol they drive nails into the beautiful frescoed walls, to hang up their accouterments, and the Rhode Islanders in the Patent Office are smashing the glass in the model cases by wholesale. One of them accidentally fired a pistol ball through two of the cases this morning.

There is a great dearth of news here just now, and as preparations progress, every one seems to be taking breath for the inevitable conflict. We continue to hear of prospects of an attack from the South ; but I doubt much whether they will venture on the offensive, in view of the energetic preparations of the government.

The Rhode Islanders elicit warm praise here, and the President has acceded to Governor Sprague's wish to send for another regiment. They are very fine looking men, and are, generally speaking, men of refinement and education. Your Seventh regiment make a more soldierly appearance ; but the free, easy dress of the Rhode Island troops look so like *work*.

A fine national flag is to be raised on the main portico of the Patent Office to-morrow with some ceremony, and Governor Sprague is expected to speak.

I hope and trust that our sad and uncalled-for national troubles will be brought to a rapid and happy termination, and that we may, through the blessings of Providence, soon find ourselves with a stronger government and a higher state of national prosperity than we have ever before known. If this be the case, *our* branch of science and industry will certainly prosper with the rest.

## The Mines of Freiberg in the Olden Times—The Divining Rod—Its Use and Users—The Labyrinth under the Town—An Adventure.

[Letter from Germany to the Scientific American.]

The mines of Freiberg rank among the oldest and richest of Europe. They are worked for the ores of silver, lead, copper, zinc, cobalt and nickel ; but the silver ores are the only ones which are of special importance. Even these do not yield a sum which can hope to attract attention in these days, when California and Australia have accustomed men to reckon treasure with six figures. A million and a half yearly is a trifle which scarcely deserves mention, in journals recording the last arrivals from the land of gold.

But the Freiberg mines are interesting in other aspects. They have now been worked for nearly seven hundred years ; and their history is almost identical with the history of the art of mining. In their numberless shafts and galleries one may trace the progress which has been made, from the days when a pit, a pickax, and a bucket constituted a mine—when a vein was worked only so long as its dimensions could be measured in front, to the present time, when steam and hydraulics leave but little for man to do, and when a vein is followed up with relentless perseverance as long as it has either length, breadth or thickness. Here may be seen the places where inventions, long since superseded by other inventions, were first applied—where such novelties as blasting and boring were first introduced—where multitudes of rough models were gradually shaped into the finished machines which now find application all over the world. The chronicles of the mining office are little more than a catalogue of experiments, successful and unsuccessful, evidences of the slow but certain progress which has been made. "Good miners," says an old writer on this subject, "are made from bad miners ;" and the history of Freiberg bears witness to the truth of the maxim. When a mine is earning money, bad processes and poor management may be tolerated ; but when it has not only ceased to pay, but begun to cost, investigation and ingenuity are aroused.

There is an old legend that the mines were first discovered by a wagoner who was transporting salt into Bohemia. His road led him over a barren and uninhabited waste, where the city of Freiberg now stands. As he was passing the place now occupied by the Rathhaus, one of his wheels ran against a rock and broke off a piece, which, because it was shiny and glittering, he picked up to take home to his children. By some mysterious means this piece of rock came into the hands of an experienced miner from the Hartz mountains, who soon discovered it to be a lead-silver ore, much richer than those which he was accustomed to deal with. An emigration of miners from the Hartz followed ; and from this beginning the city and mines of Freiberg arose.

The strangest stories are told of the singular means which the ancient miners made use of to discover where the precious minerals lay. It is almost impossible for us to conceive of the peculiar notions which men must have possessed, who hunted for ores where vapors were seen to rise—where mysterious flames appeared on the surface of the earth, "whereby the metal doth clean itself from the sulphur with which it lies"—where horses were uneasy and dogs were observed to crouch ; and whose principal reliance in finding a rich vein was placed in conjurors, who, with *wiinschel ruthe* (divining rod) in their hands, pointed out to the workmen where the ores lay. The fullest confidence was placed in their ability to discover the the precious minerals, and their services were believed to contribute as much to the welfare of the mine as those of the workmen themselves. Whole books were written on the subject, giving minute details as to the constellations under which the future diviner must be born, the manner in which he must live, and the time, place and method in which he must procure and prepare his rod. There are decrees still extant, in which it ordained that experienced diviners shall be well cared for, and their valuable lives exposed to no needless dangers—such as detention in damp passages, &c. In the Aula of the Mining Academy here, there is a portrait of the Baron von Schonberg, a former "Oberberghauptmann," or Miner General, and in his hands there is a divining rod of the kind which, in his day, was considered the best pattern.

The way in which the *wünschel ruthe* was used is another evidence that spiritual rappings is not a modern invention. The rod was generally of some wood like our hazel, split for one-half of its length, and then opened into the form of a fork. This was held with the fork ends in the hands, and the unsplit parts in the air. The rod could not be relied on unless it was of just the right size—neither too long nor too short, too large nor too small, too stiff nor too flexible. It must have been of the right material and the right age, and cut at the right time, by the right man, at the right place, the right way. Unless these preliminaries had been properly attended to, the best of rods and the best of diviners were liable to err. The rod was not considered as perfectly ready for use until it had been baptized. This ceremony was generally performed by proxy, the rod being placed under the baptismal font, or in the bed of a baptized child. Afterward it was always addressed by the name which the child had received. The following example is given in "Gaetzschmann's Bergbaukunde :"—

"In the name of the Holy Trinity, I command thee, Augusta Carolina, to tell me, &c., &c., how far it is to ore."

Several other forms, which were used by the ancient diviners, are given in the work above mentioned ; but the oaths by which the rod is adjured to tell the truth, are almost too strong to make pleasant reading.

Unlike the impudent tables of our day, these rods only turned when they were told to ; and they always waited patiently until they had heard what was desired of them, before they made any motion of their own. Then, they either pointed in the direction in which the ore lay, or indicated by strokes against the diviners breast, the number of *lachter* between him and the mineral sought. When the vein was particularly valuable, the rod manifested it by behaving in an unusually energetic manner. The strokes came quicker and stronger—the rod turned and twisted in the diviner's hands, quite regardless of his efforts to hold it steady—strange tremors and chills came over him—his body was bent and shaken, as if by spasms, and he felt a singular bitterness at the roots of his tongue. Such extreme symptoms, however, appeared but seldom, and betokened great deposits of rich ore. There were not wanting, even in that day, wise philosophers, who explained all this without bringing in the agency of the devil, as foolish people were inclined to do. In the first place, they agreed it was not likely that Satan would willingly disclose so much treasure ; and, beside, his agency was not at all necessary, for the same phenomena might be produced by the vapors of the ore, which were continually rising, and which might be supposed to exert this kind of influence over men who stood where they could be affected.

By the help of magic, or notwithstanding it, the mines of Freiberg increased and flourished, greatly to the satisfaction of the Electors of Saxony, in whose dominions they lay. In those days of wars and rumors of wars, the possession of a silver mine was of much more importance to a country than it is or could be now. For, while commerce and manufactures might be rendered unprofitable, and forced into idleness in a month, a silver mine was a constant and uninterrupted source of wealth as long as the war was kept away from the locality where it was worked. Not only were the Saxon princes made more independent in war, by the possession of Freiberg, but they were also enabled to collect the most beautiful and expensive cabinets of paintings and works of art in all Germany. The galleries and "green vaults" of

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Dresden are lasting monuments of what mining and metallurgy have done for Saxony.

By the law, all precious minerals belonged to the king, and he alone had the power of granting privileges to work them. These ancient privileges were given in two ways. Either a man was allowed a certain space, within which he could dig down as far as he chose ("until the eternal depths,") or, he was granted a similar space on a hill-side, in which he could mine as far as he wished, in a horizontal direction. From such a vague system of mining-grants, all sorts of complications arose, as might have been expected. Places were known where three or four different mines had equally good titles of possession—the workmen on two different shafts found themselves face to face and working on the same ore—in short, the law grew to be so entangling that even the Saxon Circumlocution Office was glad to have it remodeled and simplified.

At first, the number of these shafts was almost infinite. Farmers sank shafts where their beams ought to have been; those who had commenced to dig cellars concluded to change them into mines, and as long as the *wünschel ruthe* flourished, there was always some hope of finding ore. The face of the country somewhat resembles that of our American "rolling prairie." The land lies in waves, and the crests of these build long lines of hills of nearly equal level. These ridges probably seemed to the early miners the marks of huge veins, and whenever ore was found on any one of them, straightway fifty other shafts were sunk on the same line. Long rows of little mounds still remain to mark the sites and tell the story of these early adventures. Many of these old passages are used at the present time; others have long since been walled up and forgotten. It sometimes happens that a workman, engaged in extending or widening a gallery, finds, when he returns to look at the effects of his blasting, that he has broken into some old passage which, perhaps, his ancestors two or three generations before had opened and deserted. In laying the foundations for houses, and in making excavations for railway bridges, it has several times been necessary to sink an exploring shaft before commencing with the masonry. Several of the miners have branches running under the city, and there are many stories current among the people as to the uses which these have been applied to in the days of yore. It is said, also, that when the Swedes besieged the city, in the seventeenth century, a constant communication was maintained between the garrison and their friends outside, by means of these passages, notwithstanding all precautions, and to the great mortification of the enemy. At this time, indeed, the miners proved of the greatest service to the city. The Swedes were harassed from all sides, and they found it almost impossible to get a chance of retaliation. To attempt to catch an old miner, when he is once inside of his shaft and going down his ladder, is about the same thing as attempting to catch a prairie dog on the plains. Follow him down the hole where you saw him last, and he barks at you from a neighboring one. Without experience, however, it is almost impossible to find one's way in such a net work of galleries and shafts as we have here. A friend, who had been making a survey in one of the more frequented parts of the Himmelfahrt mine, dismissed his attendants, at the completion of his work, and attempted to make his own way out. He wandered for several hours through the long passage ways, with the moisture dripping down upon him from above, and the boards yielding beneath his feet, without coming to any place which he recognized. Finally the oil in his lamp became exhausted, and his light went out and left him in the dark. He dared not move forward—it was of no use to move backward—there was nothing left for him but to remain where he was and hope that somebody would come to him. At last he caught a glimpse of a light in the further end of the gallery where he was. He hastened toward it and found that it was borne by a workman who had been sent to make some repairs in this part of the mine, which was much out of order and no longer in use. My friend had wandered out of the Himmelfahrt into the Red mine, and had been walking through passages which were considered unsafe and seldom visited.

J. H. B.

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THE best oil for guns is coal oil or petroleum.

### General Scott's Mode of Life.

A Washington correspondent gives the following sketch of General Scott's mode of life and his untiring industry and vigilance:—

General Scott has left his house, and taken up day and night quarters at his office. He is feeble in body, but very clear, comprehensive and active in mind. Visiting him at near midnight, he was sitting up in a plain, hard bed, in a very plain room, with but two candles on a center table near, and two of his aids near him in waiting. Dispatches arrive almost every hour, night and day, borne by videttes from every quarter of the district, and by officers beyond the lines. He demands the fullest information from everybody, and, before the New York troops arrived, declared that he was prepared for an attack from 10,000 men by Virginia or Maryland, if they invaded the capital. His great anxiety, grief and doubt have been the disaffected citizens in the District of Columbia, scores of whom have left, but many of whom, even now, remain; but all are known and watched with a lynx-eyed vigilance. Indeed, there has been an extensive secession feeling here, and there are troops of the personal friends of Jefferson Davis and A. H. Stephens, who, as Southern men, have been much respected. No secession flag, however, floats here; and from the Hights of Georgetown to the Capitol, nothing is seen but the Stars and Stripes, with loyalty increasing every hour.

### Trade Marks and Designs.

There is a very comprehensive bill now before the British Parliament, having for its object the better protection of new designs and the "trade marks" of manufacturers. The forging or imitating of a "trade mark," or any fraudulent addition or alteration of one, is constituted a misdemeanor. A "trade mark" is defined to be "any name, word, letter, mark, device, figure, sign, seal, stamp, label." Marking with a false indication of quantity (such as a piece marked 30½ yards when it only measures 30¼), quality, or selling, with intent to defraud or imitating the names and marks of artists, are included in this bill.

Deputations from the Chambers of Commerce of London, Birmingham and Sheffield have waited upon the Lord Chancellor, and solicited amendments to the bill, substantially as follows:—A registration office for trade marks, and that the evidence of the Register be *prima facie* in relation to a disputed trade mark in court. Without a registration of trade marks, it would often be necessary to call a large number of witnesses. A complete distinction made between the marks on silver and electro-plated goods. The protection of the trade marks of foreigners on the same footing as foreign copyrights—that is, dependent on the same protection being extended to Englishmen.

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IMPORTANT SUGGESTIONS TO ARMY SURGEONS.—In the course of a battle, the gunners, and in fact all engaged, are subjected to injuries of the ear, by the heavy and long sustained discharge of powerful artillery. Numerous cases of ruptured membrane, with more or less permanent deafness, will be found among the returning soldiers. In the artillery, the effect of position with reference to the gun is peculiar. Those men who stand nearest the muzzle *feel* the report most, but all who are to the leeward suffer more than those to the windward. Let the medical staff of each regiment keep prepared a quantity of glycerine, mixed with belladonna, say about in the proportion of forty grains of the latter to the ounce of glycerine oil. Let each gunner be provided, before an engagement, with wool or cotton (the former is preferable), saturated with the mixture, to place in his ears. It will not prevent his hearing the word of command or the drum, and will prevent a great deal of injury. The therapeutic of the preventive, medical men will perceive, as it forms a coating over the membrane, which can be easily cleansed by a little warm water, and will effectually prevent the vibration of the air striking injuriously upon it. It would also be useful to those exposed to dampness when camping out at night, the organ in question being extremely sensitive to the night air. By taking this precaution, that deafness to which gunners are now so liable, may be prevented.

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FORT MONROE.—An officer from Fort Monroe says that there are now 1,300 men in the fort, that the guns are in good order, and everything is as desirable as it should be in order successfully to withstand six months' siege. The Navy Department has intelligence that the secession authorities at Norfolk have mounted several of the heavy guns dismounted by the United States. When the federal forces were about to leave, they spiked the guns and endeavored to break off the trunnions, but could not succeed.

THE CAPITAL SAFE.—The defense of Washington is amply provided for; a force of 24,300 men is now located in the capital and its vicinity, all within three hours march of the city. But a still further reinforcement is contemplated, and it is decided that within a few days there shall be an army of 40,000 men in and around Washington, to secure the control of the Potomac and the Chesapeake. At the same time a force of from 10,000 to 15,000 men will be concentrated at Cairo and the same number at St. Louis, to protect the Mississippi river, and repel any attacks which may be made upon exposed points in Southern Illinois, and suppress secession movements in Missouri and Arkansas. It is rumored that a force of 20,000 troops is to be shipped on transports, under the convoy of men-of-war, at the earliest possible moment, to harass the secession forces in the Gulf States, and exhaust their energies by compelling them to move from point to point, and thus prevent their advance to the North. It is designed also to further reinforce Fort Pickens from this fleet.

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THE BLOCKADE OF SOUTHERN PORTS.—Most active preparations are being made for the further blockading of Southern ports. The entire fleet will consist of at least fifty war vessels of various descriptions, accompanied by sufficient steam transports for the accommodation of a land force of at least 20,000 strong. Thus it will prove sufficient to make an efficient blockade of every inlet on the Southern coast, into which any vessel drawing six feet water might otherwise enter. After this blockade is effectually completed, we do not see how the South can ship their cotton or supply themselves with the necessaries of life, unless *via* some Northern city by inland transportation.

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WORKMENS' COURTS OF CONCILIATION.—A bill has been introduced into the British Parliament for establishing Councils of Conciliation to settle differences between employers and their workmen. It provides for councils which shall consist of an equal number of employers and the workmen, but the chairman of a council must neither be an employer nor operative mechanic. All trade disputes are to be brought before such councils who are to decide them; but they are not authorized to establish a rate of wages, or prices which shall be paid for work. In France, there are courts called *prud-hommes*, which are similar in their nature to the proposed Councils of Conciliation, but trades unions are not allowed in the empire.

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SOME FACTS IN REGARD TO POPULATION.—By the census of 1860, the free population of all the slave States is 8,434,126. That of the three largest of the free States is:—New York, 3,851,563; Pennsylvania, 2,311,786; Ohio, 2,377,917. Total—8,541,266. If we deduct from the aggregate of the slave States the free population of Delaware, Maryland, Kentucky and Missouri, it leaves to the secessionists a total population of 5,671,723. The total population of the nineteen free States is 18,950,759.

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THE PROPORTIONS OF THE AMERICAN FLAG.—The American flag properly should consist of thirteen stripes—seven red and six white—one for each of the original States. The flag should be one-half longer than wide, no matter what should be its size. The blue or Union should cover seven stripes—starting with and ending with a red stripe—should be one-third longer than wide, and contain one star for each State in the Union (thirty-four).

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MAJOR ANDERSON said of the men he had with him in Fort Sumter:—"Until a man is half starved, half smothered, half poisoned, and on the voyage to eternity in this state, he never can know what men I had, or understand the measure of the valor that made surrender the last thought with them."

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JEFFERSON DAVIS WILL COMMAND THE SOUTHERN ARMY.—The Charleston *Courier* says: "We learn from the most reliable source that President Davis will take command in person as General-in-Chief of the forces gathering in Virginia."

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THE value of the copper and copper ore shipped from the Lake Superior regions last year was $2,944,000; the value of the iron ore and pig iron shipped was $488,550.

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## PATENT CLAIMS.

Owing to the interruption of the mail, our official list of patent claims was not received in time for this week's paper. We print in place of them a very interesting account of the mines of Germany with their curious old superstitions about witch hazels, and other modes of finding treasure.

### To Treat Potatoes and Prevent Rot.

The *Country Gentleman* states that a foreign farmer came to the conclusion last year that the potato rot was caused by a minute fungus, which commenced on the leaf, propagated with great rapidity, and washed into the tubers by rains. He tried the following experiment to prevent its injurious effects, and was very successful. He planted potatoes in double rows instead of single, the two rows occupying about a foot in width, a foot of vacant space remaining on the outside of each row. They were planted upon the level ground, and hoed up at the usual time. When the tops had attained their full growth, about the first of July, he turned them over right and left toward the vacant spaces, by adding earth between the rows and pressing down the haulms, so as to prevent their retaining an erect position, and to allow the rain, instead of descending to the roots, to run off upon the vacant space. The result was a most excellent crop, while other potatoes of the same species planted in the same field in the common way, turned out a complete failure. This system can be easily tried without involving extra labor or expense.

### Lofty Roofs for Photographic Rooms.

A correspondent of the *Photographic News* states that rooms with lofty ceilings—glass roofs—produce pictures very superior to those which have low roofs. He says:—"Above all things, have a lofty room, 10 or 12 feet high where the sitter stands, and then you may use almost direct light overhead, and yet you have it soft. Decidedly, have your glass to the floor, if you can, and let the sitter look at the north or northeast; your camera will then be in the south, and have a good-sized box or screen to keep the direct light from the lens. My opinion is, that if the sitter is in direct sunlight, or rather in the direction of direct light (say south, southeast or west), no matter how your blinds are arranged, you cannot depend on soft pictures, and you are at the mercy of every passing cloud. In the other position, by a very little management, you can work without being annoyed with sunshine, at every period of the year, and all day long."

SOLDIERS' UNDERCLOTHES.—On this subject, the Philadelphia *Ledger* presents the following very timely remarks:—"We would remind all who are volunteering as soldiers, and their friends, that one great danger to which they will be exposed arises from the miasmata generated in low, swampy districts in Southern climates. Northern men cannot guard too carefully against the ravages of disease, induced, in most cases, by dressing too lightly or exposure to night air. We are apt to imagine the planter in Virginia as being rigged out in a broad-brimmed hat and brown linen during the summer season; but not a few are in the habit of dressing in woolen clothes the whole year round, while the practice of wearing flannel underclothes is all but universal. Engineers and firemen are obliged to wear the same dress, and for a like reason. The profuse perspiration which flows through the pores, renders the body peculiarly liable to the dangerous effects of sudden chills, and flannel is the best preventive against these, as well as the attacks of the malarious influence."

SHEET ZINC FOR ROOFING.—A report of a committee appointed by the Central Society of Architects, in Paris, recommends "that zinc, which was at first rejected, but is now so generally used, should be applied with great care, as certain precautions, very simple, but never to be overlooked, are indispensable. Thus: contact with plaster, which contains a destructive salt, is to be avoided; also, contact with iron, which is very injurious, and liable to cause a rapid oxydation. Eave gutters should always be supported by galvanized brackets, and no gutter or sheet zinc should be laid on oak boards.

## Notes and Queries

M. H. M., of N. Y.—We should suppose that the simple way of expelling air from butter cans would be to fill the cans by compression perfectly full of butter, leaving no room for the air.

J. W. W., of N. H.—You will find the information which you ask for in relation to the cost, &c., of howitzers, in the last and present numbers of the SCIENTIFIC AMERICAN. Each arm of the service, the infantry, the artillery, and the cavalry, has its special uses, and no army is complete without them all.

G. H., of Ky.—"The Microscope and its Revelations," published by Blanchard & Lea, of Philadelphia, contains the information you desire respecting the construction of the microscope.

R. M., of Mich.—The only way to make the stamp heads of cast iron hard is to cast the metal in iron molds, so as to chill-harden the surface. Wolfram cannot be obtained here. The hardest cast iron with which we are acquainted is made from the Franklinite ore in New Jersey.

C. D. S., of N. Y.—Brass is an alloy composed of copper and zinc. Its rate of expansion depends entirely upon the relative quantities of the two metals of which it is formed. It is difficult to find two pieces of brass (if made in different establishments) that will expand equally. Well-tempered spring wire will bend around a common thread spool and spring back again. Its elasticity depends entirely upon the temper given to it.

S. F., of Pa.—It is necessary, in laying railroad rails in winter, to leave a space between their ends to allow them to expand in warm weather. A sphere is the strongest hollow body of a given diameter to resist pressure on all parts of the surface. Crucibles are made of plumbago and of platinum.

R. B., of Mass.—The writer of this has seen men in California digging with spades into granite seven feet in depth. The surface of the granite there is being disintegrated from the decomposition of the feldspar. There is nothing in science better settled than the composition of water; it is composed of 1 pound of hydrogen to 8.013 pounds of oxygen; but it is so powerful a solvent that it is seldom obtained in a state of purity.

J. T. R., of N. Y.—A decoction of sumac, or dilute gallic acid will answer to prepare your writing paper, to prevent the successful erasure of writing. Paper prepared in this manner, if written upon with ink containing the sulphate of iron, will show a dark border around every letter that has been erased with any of the known chemicals used by counterfeiters, and thus fraudulent efforts at altering such writing can be detected.

T. N. B., of Conn.—No electric engine can generate a current of electricity sufficient to drive itself, and, at the same time, have a surplus for depositing metals. Such a motor would be perpetual motion, which is a mechanical impossibility.

W. A. B., of Conn.—To color cotton red, steep it in a decoction of sumac for 10 hours, then take it out, squeeze the water from it, and steep it for five hours in a solution of alum. After this, wash the cotton, squeeze and handle it in a hot decoction of redwood, when it will be dyed a good red color. Four pounds of redwood are required for 10 pounds of cotton.

W. M., of Mass.—An excess of sulphur and the addition of two-fifths of chlorate of potassa, to common powder will render it very rapid of ignition. Powder for blasting in mines, containing about twenty-five per cent of chlorate of potassa, has been patented. Its combustion is very perfect, but for rifled fire-arms and large cannon, common coarse powder is the safest and best. Hard coal may be used as a substitute for charcoal, in making powder, but it is not so good. Charcoal made of willow is the best for making gunpowder.

J. Y., of Pa.—In some of Sharpe's rifles, the breech-gate becomes so expanded by heat, after firing a few shots, that it is almost impossible to move it. This is not owing to any defect in the principle of the gate, but from imperfect workmanship. We have now a Sharpe's rifle which never becomes stiff in working, however rapidly it may be fired, but it leaks a little at the breech. This could be avoided by using a graduated and adjustable spring for pressing on the back of the breech-gate. This rifle has to be protected from rain, as the moisture is liable to get into the charge.

J. C., of Pa.—In rifled cannon, the windage is generally filled with leaden bands. The only wad used in cannon is the flannel bag of which the cartridge is made.

G. F. L., of N. Y.—Wood can be coppered by the electro-plating process. It is covered with plumbago for the operation, as this is a good conductor.

H. W., of Pa.—While petroleum oils may be very excellent to prevent the surface of polished iron from oxydizing, we do not think they can ever supersede pure sperm oil as a lubricator. The heavy or "dead" coal oils are somewhat unctuous, but the lighter qualities are not; they are as volatile as alcohol, and are not oils within the old meaning of the term.

J. K., of Ohio.—The peroxyd of manganese has been used for many years for rendering linseed oil quick-drying. It is added slowly to the oil while the latter is boiling. About an ounce to the pint will be sufficient for your purpose. If you desire to keep the oil as clear in color as possible, use the sulphate of zinc, or sugar of lead, for rendering it quick-drying. Litharge gives a dark brown color to the oil.

E. H. N., of Mass.—Your plan for a camp bakery seems to be an excellent invention. What say you to our publishing an engraving of it?

### Money Received

**At the Scientific American Office on account of Patent Office business, for the weekending Saturday, May 4, 1861:—**

J. B. B., of Cal., $15; S. & A., of Ohio, $25; C. R., of Vt., $30; T. K. A., of N. Y., $15; G. G. C., of Mich., $25; L. S., of N. Y., $40; S. J. G., of N. Y., $10; C. T. P., of N. Y., $350; J. F. H., of N. Y., $30; C. & W., of Maine, $25; A. B. P., of Cal., $25; K. & B., of Cal., $25; J. S. S., of N. Y., $20; R. B. N., of Cal., $150; W. B., of N. J., $25; P. R., of Iowa, $22; C. & W., of N. Y., $12; G. S., of Iowa, $15; T. C. C., of N. Y., $25; J. D. B., of N. Y., $25; D. S., of Mass., $25; H. L. P., of Mich., $25; J. A. B., of Mich., $10; W. Y., of N. Y., $25; A. T., of N. Y., $15; I. S. S., of N. Y., $40; W. L. S., of Cal., $50; W. & S., of Ohio, $15; G. & C. B., of N. Y., $20; S. R. W., of N. Y., $15; H. A. H., of Mass., $20; G. W. C., of Ga., $25; D. B., of Mo., $25; J G. W., of N. Y., $100; C. & L., of N. Y., $25; C. B., of N, Y., $15; A. A., of Ill., $30; M. M. P., of Vt., $15; W. F., of Ill., $15; M. L. G., of Ill., $15; J. G., of N. Y., $15; S. E. A., of N. Y., $25; M. G. C., of N. Y., $20; A. W., of Vt., $15; M. L. B., of N. Y., $20; J. & R., of N. Y., $20; T. G., of Mich., $25; W. W., of N. Y., $25.

Specifications and drawings belonging to parties with the following initials have been forwarded to the Patent Office during the week ending May 4, 1861:—

C. R., of Vt.; T. C. H., of N. Y.; G. G. C., of Mich.; E. C., of N. Y.; G. L., of N. Y.; W. Y., of N. Y.; A. L., of Cal.; M. G. C., of N. Y.; H. L. P., of Mich.; S. & A., of Ohio; D. S., of Mass.; W. W., of N. Y.; J. G. W., of N. Y.; C. & W., of Maine; L. S., of N. Y.; A. B. P., of Cal.; S. A. B., of Conn.; C. & W. H. R., of Mass.; A. A., of Ill.; J. D. B., of N. Y.; S. S. H., of N. Y.; C. & W., of N. Y.; S. R. H., of N. Y.; S. E. A., of N. Y.; C. & L., of N. Y.; K. & B., of Cal.


### RATES OF ADVERTISING.

**Thirty Cents** per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns; and, as heretofore, the publishers reserve to themselves the right to reject any advertisement sent for publication.

## CHANGE IN THE PATENT LAWS.

### NEW ARRANGEMENTS—PATENTS GRANTED FOR SEVENTEEN YEARS.

The new Patent Laws, recently enacted by Congress, are now in full force, and promise to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from **$30** down to **$15**. Other changes in the fees are also made as follows:—

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| On filing each Caveat | $10 |
| On filing each application for a Patent, except for a design | $15 |
| On issuing each original Patent | $20 |
| On appeal to Commissioner of Patents | $20 |
| On application for Re-issue | $30 |
| On application for Extension of Patent | $50 |
| On granting the Extension | $50 |
| On filing Disclaimer | $10 |
| On filing application for Design, three and a half years | $10 |
| On filing application for Design, seven years | $15 |
| On filing application for Design, fourteen years | $30 |

The law abolishes discrimination in fees required of foreigners, except in reference to such countries as discriminate against citizens of the United States—thus allowing English, French, Belgian, Austrian, Russian, Spanish, and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the Inventors throughout the country, we would state that we have acted as agents for more than FIFTEEN THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees, at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time, and on the most liberal terms.

### Testimonials.

The annexed letters, from the last three Commissioner of Patents, we commend to the perusal of all persons interested in obtaining Patents:—

Messrs. MUNN & Co.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved as I have always observed, in all your intercourse with the Office, a marked degree of promptness, skill and fidelity to the interests of your employers. Yours, very truly,

CHAS. MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster-General of the United States, he addressed to us the subjoined very gratifying testimonial:—

Messrs. MUNN & Co.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you have discharged your duties of Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy, marked ability and uncompromising fidelity in performing your professional engagements. Very respectfully,

Your obedient servant, J. HOLT.

MESSRS. MUNN & Co.:—Gentleman: It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency, and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully,

Your obedient servant, WM. D. BISHOP.

### The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

### Preliminary Examinations at the Patent Office.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention


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has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent, &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. Over 1,500 of these examinations were made last year through this Office, and as a measure of prudence and economy, we usually advise Inventors to have a preliminary examination made. Address MUNN & CO., No. 37 Park-row, New York.

### Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row New York.

### How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention, if susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition is composed, for the Patent Office. These should be securely packed, the Inventor's name marked on them, and sent, with the government fee, by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park-row, New York.

### Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of their case, inclosing the official letters, &c.

### Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our Branch Offices.

### Interferences.

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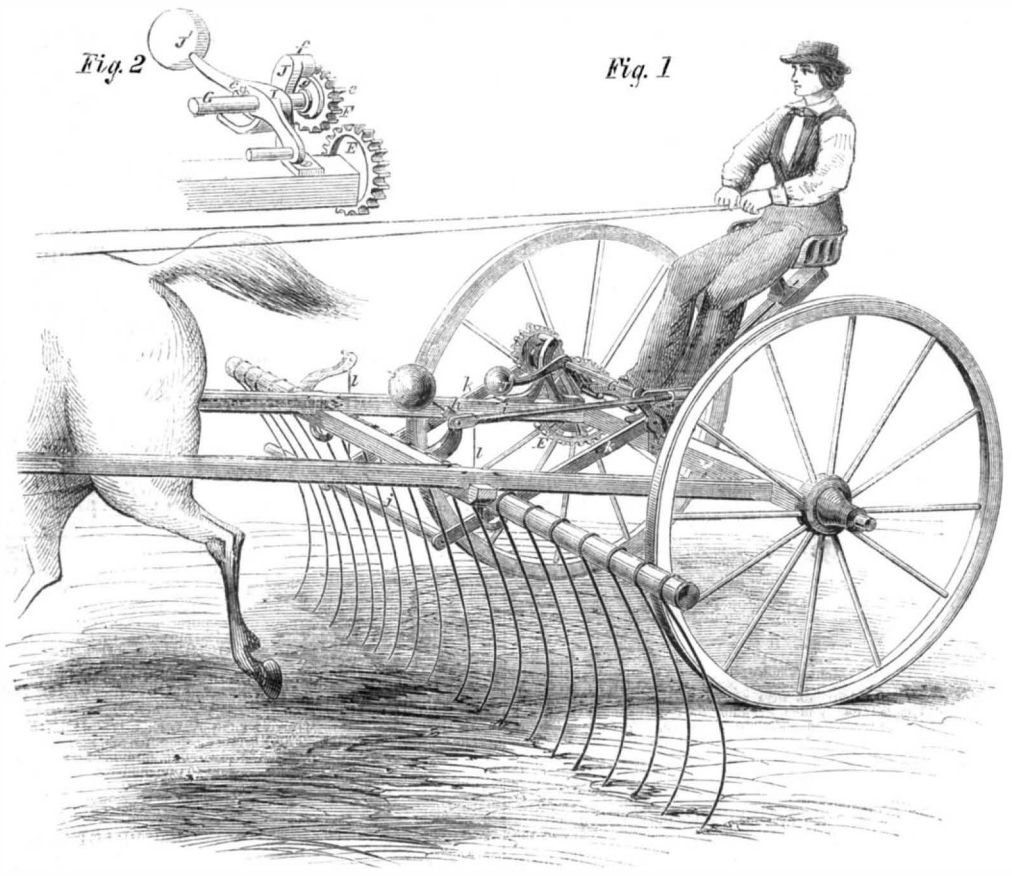
### Improvement in Horse Rakes.

In the kind of horse rake represented in the accompanying engraving, which has metallic teeth, the teeth are held down in nearly vertical position while the load of hay is being gathered as the machine passes along, and are turned up backward to deposit the hay in the windrow; the rake head being fitted to rock in its bearings in order to permit this motion. In the rakes heretofore in use, this motion has been effected by the muscular power of the operator; but as all of the teeth in a broad rake are quite heavy, it requires no inconsiderable exertion to swing them back, and the frequent performance of this operation is found to be very fatiguing. The object of the invention here illustrated is to render the swinging back of the rake teeth more easy, and to enable it to be performed by the power of the horse. The mechanism is simple, and is clearly shown in the engravings.




## STODDARD'S IMPROVEMENT IN HORSE RAKES.

An arm, *h*, Fig. 1, is secured firmly to the middle of the rake head, and is connected by a rod, *i*, to a crank upon the end of rockshaft, G, Figs. 1 and 2. The opposite end of this rockshaft has its bearing in the short arm of a weighted lever, I, so that the operator, by pressing his foot upon this short arm, may carry down the pinion, F, into gear with the wheel, E, which is firmly secured to the hub of one of the wheels. From this arrangement it will be seen that when the wheels are in gear, a swinging motion up and back will be given to the rake teeth; but as it is desirable that they should remain either in their raised or their vertical position, until the driver chooses to change them from the one position to the other, arrangement is made for throwing the pinion, F, automatically out of gear when it has performed one-half of a revolution, and holding it in place until the driver again, with a touch of his foot, presses it down into gear. To this end, two long teeth, *e*, Fig. 2, are made on opposite sides of the pinion, F, and when one of these strikes the wheel, E, the pinion, F, is lifted up out of gear, the ball, J′, aiding the the movement and holding the shaft, G, and pinion, F, up in their position. To prevent the rockshaft, G, and consequently the rakehead, from turning after the teeth have reached either their raised or their vertical position, a cam plate, *g*, is fastened upon the rockshaft, G, with two shoulders upon its edge opposite to each other, and just after the pinion, F, is thrown out of gear, one of these shoulders comes against a square shoulder, *f*, on the standard, J. It will thus be seen that, by a touch of the driver's foot upon the short arm of lever, J, throwing the pinion, F, into gear with the revolving toothed wheel, E, the rake teeth are swung either up or down, when they remain in either position until they are removed from it by another touch of the driver's foot. The swinging of the rakehead is also facilitated by a heavy ball upon the arm, *h*, on the rakehead balancing the weight of the teeth. This improvement is applicable to any of the horse rakes with metallic teeth, and is secured by separate Letters Patent.

In addition to the ordinary service of raking hay into windrows, this rake is also adapted for gathering the windrows into cocks. When thus employed the long slender teeth are stiffened by a brace, which may be readily attached to the machine. This brace is formed by a bar, *j*, Fig. 1, and the two rods, *k k*. These rods are connected by long slots at their rear ends with brackets on the axle, while their forward ends with the bar, *j*, are supported by the pendent rods, *l l*, which are attached by pivots to two arms upon the rakehead. It will thus be seen that, as the rakehead is turned forward, the bar, *j*, is lifted up behind the rakehead out of the way of the rising teeth.

The superior advantage of this horse rake and cocker consists chiefly in entirely transferring to the horse the usual labor of holding the rake down while gathering its burden of grass, and tilting it up to leave the same, and also in tumbling the windrows into heaps by horsepower, thus reducing this branch of manual labor to the mere touch of the toe to a pedal; both hands being left at liberty to manage the horse. The rake being placed in front of the wheels, three advantages are secured:—1st, The lateral or side jerking of the horse is diminished in proportion as the wheels are placed nearer together; 2d, The grass is gathered before the wheels press it on to the ground, which is particularly desirable where it is wet; 3d, The driver can see whether the grass is being raked clean without looking back of him.

Experienced and competent agriculturists pronounce this rake a decided success, and it seems to us that it reduces the labor of gathering hay to the lowest point conceivable. In these time, when so many men are going away to the wars, all mechanism which facilitates the labors of those remaining is of great value to the country; and this is especially true of machines which enable the work of a man to be done by a boy.

Applications have been made, through the Scientific American Patent Agency, for two patents on this invention; one on several combinations for operating the rake, and the other on the ball or weighted arm for balancing the teeth. Further information in relation to it may be obtained by addressing the inventor, J. C. Stoddard, at Worcester, Mass.

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Danger of Tinned Lead Pipes.—Dr. Frankland, F.R.S. (London) states that he has made several experiments with lead pipes tinned inside, in order to discover if the tin was a preventive of lead corrosion by the water. It was found to be a complete protective, when all the surface was perfectly coated, but the least flaw in the tin coating, if it exposed the lead to the water, was more dangerous than the use of pure lead pipe. The reason given for this is, that a galvanic action is engendered between the two metals, by which the lead is rapidly decomposed, and made to poison the water.

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